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CIVIL ENGINEERS

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BOSTON SOCIETY OF CIVIL ENGINEERS

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Editor—EDWARD C. SHERMAN
6 Beacon Street, Boston

Vol. II APRIL, 1915 No. 4

BOSTON SOCIETY OF CIVIL ENGINEERS
FOUNDED 1848

PROCEEDINGS

NOTICE OF REGULAR MEETING.

A REGULAR meeting of the Boston Society of Civil Engineers will be held on

WEDNESDAY, APRIL 21, 1915,

at 7.45 o'clock P.M., in CHIPMAN HALL, TREMONT TEMPLE, BOSTON.

Mr. J. Albert Holmes will read a paper entitled "Construction of the Earth Dam at Somerset, Vermont." Mr. Holmes, who was the resident engineer during the construction of this dam, will illustrate his paper with a number of lantern slides showing the work during its construction.

S. E. TINKHAM, *Secretary.*

PAPERS IN THIS NUMBER.

"The Elimination of Grade Crossings," L. Bayles Reilly.

Address at the Annual Meeting, March 17, 1915, Harrison P. Eddy.

Address at the Annual Meeting of the Sanitary Section, March 3, 1915, Bertram Brewer.

CURRENT DISCUSSIONS.

Paper.	Author.	Published.	Discussion Closes.
"Insurance for Engineers."	N. H. Daniels.	March.	May 15.

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MINUTES OF MEETINGS.

Boston, February 24, 1915. — A special meeting of the Society was held this evening in the Society Rooms, and was called to order by the President, Harrison P. Eddy, at 8 o'clock. There were 56 members and visitors present.

The meeting was held to discuss some of the problems of the inspector. The particular topic taken up was, "Rust on Reinforcing Rods and Its Effect on the Strength of Concrete."

The discussion was opened by Mr. J. R. Worcester, who was followed by Messrs. C. R. Gow, P. B. Walker, A. O. Doane, R. A. Hale, H. F. Bryant, J. L. Howard and others of the Society, and by Prof. W. C. Voss of the Wentworth Institute of Boston.

Adjourned.

S. E. Tinkham, *Secretary.*

Boston, March 10, 1915. — A special meeting of the Society was held in the Assembly Hall of the Engineers Club this evening, and was called to order by the President, Harrison P. Eddy, at 8 o'clock. There were 65 members and visitors present.

The President introduced the speaker of the evening, the Hon. James Logan, ex-mayor of Worcester, Mass., who delivered an exceedingly interesting address entitled " The Public Service Corporation and the Municipality."

Discussion followed, in which Mr. F. J. Macleod, chairman of the Public Service Commision, and Mr. Alonzo R. Weed, chairman of the Board of Gas and Electric Light Commissioners, took part.

S. E. Tinkham, *Secretary.*

Boston, March 17, 1915. — The sixty-seventh annual meeting of the Boston Society of Civil Engineers was held at the new club-house of the Boston City Club, Somerset Street, Boston, at 12 o'clock m., President Harrison P. Eddy in the chair.

The reading of the record of the last regular meeting was, by vote, dispensed with and it was approved as printed in the March JOURNAL. The records of the special meetings held on February 24 and March 10 were read by the Secretary, and by vote they were approved.

The Secretary reported for the Board of Government that it had, on March 5, 1915, elected to membership in the grades named, the following candidates:

Members — Robert Edward Barrett, John James Eisnor, Leroy Ernest Gardner, Harry Gilbert Hunter, Abraham Lincoln Lampie, Richard James McNulty, Edward Smulski and David Y. Swaty.

Juniors — Herbert Nelson Ackerson, Walter Harrington and Joseph Ernest Roy.

It had also elected, by unanimous vote, as honorary members, Clemens Herschel and Hiram F. Mills.

The Secretary read the annual report of the Board of Government, and by vote it was accepted and ordered to be placed on file.

The Treasurer presented and read his annual report. By vote, it was accepted and ordered to be placed on file. He also read the report of the auditing committee, and by vote it was accepted and ordered to be placed on file.

The Secretary read his annual report, and by vote it was accepted and ordered to be placed on file.

Mr. Wason, chairman of the Excursion Committee, made a verbal report which was accepted.

The Librarian read the annual report of the Committee on the Library, and by vote the report was accepted and ordered to be placed on file.

The Secretary read the annual report of the Committee on Social Activities, and by vote it was accepted and ordered to be placed on file.

On motion of Mr. C. W. Sherman, it was voted to refer to the Board of Government, with full powers, the question of appointing the special committees of the Society.

On motion of Past-President Fay, the following resolution was unanimously adopted:

Resolved, that the thanks of the Boston Society of Civil

Engineers are hereby tendered to Roland B. Pendergast for his efficient services in preparing and securing the publication of suitable press notices relating to the activities of the Society during the past year.

On motion of Mr. C. W. Sherman, the following vote was unanimously adopted:

Voted, that the thanks of the Society be extended to the Hon. James Logan for the very able and interesting address which he delivered at the special meeting of March 10, 1915.

It was also voted unanimously to send some flowers to Mr. E. M. Blake, chairman of the Committee on Social Activities, who is confined to his house by serious sickness, and to express to him the best wishes of the Society and its earnest hope for his speedy restoration to health.

The President read a letter from Prof. George F. Swain, chairman of the Boston Transit Commission, extending an invitation to the members of the Society to visit this afternoon the new Washington Station of the Dorchester Tunnel Subway.

The retiring President, Mr. Harrison P. Eddy, then delivered an address, entitled " The Duties and Sphere of Action of a Local Engineering Society with Special Reference to the Boston Society of Civil Engineers."

The members then adjourned to the auditorium of the club, to partake of the thirty-third annual dinner. At the close of the dinner, business was resumed, and Past-President Henry F. Bryant, at the request of the President, presented, in the name of the Society, the Desmond FitzGerald medal for the year 1914 to Joseph Ruggles Worcester, for his paper entitled " Boston Foundations." Mr. Worcester expressed his appreciation of the honor accorded him in the presentation of the medal, and thanked the Society for the same.

The tellers of election, Messrs. Hiram A. Miller and Henry B. Wood, then submitted their report giving the result of the letter ballot. In accordance with this report the President announced that the following officers had been elected:

President — Charles R. Gow.
Vice-President (for two years) — Ralph E. Curtis.

Secretary — S. Everett Tinkham.
Treasurer — Frank O. Whitney.
Directors (for two years) — Edmund M. Blake and George C. Whipple.

The President then called upon Mr. Robert Spurr Weston and Mr. Irving E. Moultrop, each of whom had received hearty support for the office of president, to tell the members what they had proposed doing if they had been elected. They responded in a facetious vein which was thoroughly enjoyed by the members. The President-elect, Mr. Charles R. Gow, was then presented and responded in a similar happy manner, but concluded by expressing his sincere thanks for the honor they had bestowed on him in this election and promised to do all in his power to forward the best interests of the Society.

Mr. Frederick H. Newell, consulting engineer, United States Reclamation Service, then delivered an illustrated lecture on "Engineering and Economic Results Obtained by the United States Reclamation Service," to which address his audience listened with deep interest.

In the evening the "Smoker" was held in the auditorium, the attendence being 260. There was music by an orchestra, the old songs and some new ones by members, and an entertainment by Mr. Thrasher in Canadian patois and Mr. Starbuck on the xylophone. Light refreshments were served during the evening.

S. E. Tinkham, *Secretary.*

Boston, March 31, 1915. — A special meeting of the Boston Society of Civil Engineers was held this evening at Chipman Hall, Tremont Temple, and was called to order by the President, Charles R. Gow. There were 104 members and visitors present.

The President introduced Mr. Edward F. McSweeney, Chairman of the Directors of the Port of Boston, who gave an address on "The Future of the Port of Boston." The address was illustrated by a number of lantern slides and maps. A short discussion followed the address, during which Mr. McSweeney very kindly answered a number of questions asked by those present.

On motion of Past-President Eddy, a rising vote of thanks was tendered Mr. McSweeney for his kindness in presenting, in so interesting a manner, the topic of the evening.

Adjourned.

S. E. TINKHAM, *Secretary.*

ANNUAL REPORTS.

ANNUAL REPORT OF THE BOARD OF GOVERNMENT FOR THE YEAR 1914–15.

BOSTON, MASS., March 17, 1915.

To the Members of the Boston Society of Civil Engineers:

Pursuant to the requirements of the Constitution, the Board of Government presents its report for the year ending March 17, 1915.

The total membership of the Society a year ago was 837, of whom 762 were members, 37 juniors, 2 honorary members, 22 associates, and 14 were members of the Sanitary Section only.

The total loss in membership during the year has been 33, of whom 19 resigned, 10 forfeited membership on account of non-payment of dues and 4 have died.

There has been added to the Society during the year a total of 124 members of all grades: 120 have been elected and have completed their membership, 4 have been reinstated, 4 juniors and 1 associate have been transferred to the grade of member, and 1 member has been made an honorary member; 23 have been elected to membership but have not as yet completed their membership, and one honorary member has not yet accepted his election. Fifty-two applications are now before the Board for action.

The present membership of the Society consists of 3 honorary members, 832 members, 58 juniors, 24 associates and 11 members of the Sanitary Section only, making a total membership of 928; to this might be added those who have not completed their membership and whose applications are still before the Board, making a grand total of 1 004.

The Board of Government by unanimous vote has elected as honorary members, Clemens Herschel of New York City, who joined the Society June 8, 1874, and continued his membership to date; and Hiram F. Mills, of Lowell, Mass. Mr. Herschel served as treasurer of the Society from September 4, 1874, to March 17, 1880, and as president from March 17, 1890, to March 18, 1891.

The record of deaths during the year is —

Albert H. Howland, died April 5, 1914.
Clifford N. Cochrane, died August 8, 1914.
Levi G. Hawkes, died November 8, 1914.
Lucian A. Taylor, died November 19, 1914.

By virtue of authority granted by By-Law 8, the Board of Government, for reasons which it deems sufficient, have remitted the dues of twenty-three members of the Society.

Ten regular and four special meetings have been held during the year. The average attendance at the ten regular meetings was 152, the largest being 396 and the smallest 63; and at the four special meetings the average attendance was 52, the largest being 65 and the smallest 36.

The following papers and talks have been given at the meetings:

March 18, 1914. — Nelson P. Lewis, "City Planning from the Standpoint of the Engineer." (Illustrated.)

March 25, 1914 (special meeting).— Leslie H. Allen, "Cost Accounting on Construction Work."

April 15, 1914.— J. S. Miller, Jr., "Asphalt and Asphaltic Street and Road Construction." (Illustrated with motion pictures.)

May 24, 1914.— Edward S. Larned, "The Manufacture of Portland Cement." (Illustrated with motion pictures.)

June 10, 1914.— Lester W. Tucker, "The Phosphate Rock Industry of Florida." (Illustrated.)

September 16, 1914.— C. A. P. Turner, "The Mechanics of Reinforced Concrete under Flexure in Beam and Slab Types."

October 21, 1914. — Col. William D. Sohier, "French, English and American Roads and Road Systems." (Illustrated.)

November 18, 1914. — Henry M. Waite, "The Commission-Manager Form of Government and Its Relation to the Engineering Profession."

December 16, 1914. — E. R. B. Allardice and Burdett C. Thayer, "The Hydro-Electric Power Plant at the Wachusett Dam, Clinton, Mass." (Illustrated.)

January 13, 1915 (special meeting). — Discussion of paper on "Construction Management," prepared by Sanford E. Thompson and William O. Lichtner.

January 27, 1915. — Nathan H. Daniels, "Insurance as an Aid to Engineers." (Illustrated.)

February 17, 1915. — William S. Johnson, "Ground Water Supplies." (Illustrated.)

February 24, 1915 (special meeting). — Topic of discussion, "Rust on Reinforcing Rods and Its Effect on the Strength of Concrete."

March 10, 1915 (special meeting). — Hon. James Logan, "The Public Service Corporation and the Municipality."

The Sanitary Section has held six meetings, with an average attendance of 53. The following papers have been presented at the meetings of the Section:

March 4, 1914. — "The Collection and Treatment of Sewage in Their Relation to the City of Philadelphia," George S. Webster.

May 11, 1914. — "The Development and Present Status of Sewage Purification in England," Arthur J. Martin.

November 27, 1914. — "The Industrial Wastes of Chicago, with Particular Reference to the Packing Industry," Langdon Pearse.

December 9, 1914. — "The Economic Depth of Trickling Filters," Harrison P. Eddy. "A Study of Depth of Filter Material in Connection with Trickling Filter Efficiency," H. W. Clark.

January 6, 1915. — "Diatoms," F. F. Forbes and Dr. J. W. M. Bunker.

February 3, 1915. — "Garbage Disposal at Worcester, Mass.," Dr. Frederic Bonnet, Jr. "Garbage Reduction Plants at Cleveland, Schenectady and New Bedford," W. J. Springborn.

The Sanitary Section made an excursion to Fitchburg, Mass., on June 3, 1914, which included an inspection of the sewage treatment works. The members were entertained by the city at lunch and with a trolley trip to Whalom Park and Wachusett Lake. The attendance was 65.

Coöperation with local members of the American Society of Mechanical Engineers and the Boston Section of the American Institute of Electrical Engineers has been continued as during the past few years, a joint meeting having been held under the auspices of each society. The Joint Engineering Dinner was held on February 15, 1915, the Boston Society of Civil Engineers taking the initiative. The attendance at this meeting was 275. James W. Rollins, past president of this Society, acted as toastmaster. The meeting was addressed by his Excellency Governor Walsh and others, and proved to be a very enthusiastic gathering and an enjoyable and profitable meeting.

The Board of Government has adopted the recommendation of the committee appointed to award the Desmond FitzGerald medal, and announces that it will be given this year to Joseph R. Worcester, past president, for the paper entitled, "Boston Foundations," presented January 28, 1914.

The work of rearranging and cataloguing the library has been continued, and during the last three months, on account of the pressure of clerical work, a stenographer has been employed, thus enabling the assistant librarian to devote more time to the library work.

The Board has added to the furnishings of the rooms, at a cost of $237.94, which sum has been paid from the special appropriation of $2 000 made from the Permanent Fund in November, 1912. The balance of this fund unexpended is $613.52; such part of which as is not expended prior to November 20, 1915, will revert automatically to the Permanent Fund.

On May 20, 1914, the Society made from the Permanent Fund a special appropriation not to exceed the amount of the entrance fees for the fiscal years 1913 and 1914, for use in meeting current expenses this year. The amount which could have been expended under this authorization is $1 400. The Board, however, has expended from this appropriation only the sum of $101.50, and that for the purchase of books for the Library.

Interest on the Permanent Fund has amounted to $1 634.34 during the year. This fund now amounts to $34 582.13, not including the balance in the appropriation for furnishing, and over $35 000 including this balance.

The Editor has submitted a report covering the first volume of the JOURNAL, published during the calendar year 1914, which is submitted for publication with the reports of the other officers of the Society. This report shows that the volume contained 914 pages in all, with 114 cuts and 26 inserted plates, and that the gross cost was $4 285.74. The net cost, after deducting sums received for advertising, sales of the JOURNAL, etc., was $2 660.93, an average of $266.09 for each number. This figure would have been considerably less except for the abnormal cost of the plates accompanying the valuable paper on "Boston Foundations." The average net cost for the other nine issues was about $180.

The average net cost to the Society of the *Journal of the Association of Engineering Societies* in previous years was about $2 000 per year, in addition to which the *Bulletin* showed an average gross cost of about $780, and a net profit of about $150, making the total net cost of the Society's publications under the old arrangement about $1 850 per year, or substantially the same as the net cost of our present JOURNAL under normal circumstances.

It was originally hoped that it might be possible to reprint at the end of the year the papers and discussions appearing in the JOURNAL, thus arranging the discussions to follow the papers to which they pertain, and bringing together in a single volume all of the transactions of the Society, eliminating the notices, proceedings of meetings, and other material primarily of temporary interest; and with this object in view the type was kept standing until the end of the year. But estimates prepared when the amount of material in the volume was known indicated that the cost would be prohibitive, and the Board of Government therefore abandoned the idea.

With the completion of the first volume of the JOURNAL, the experimental period may be said to have passed. It has now been demonstrated that the Society can publish its own journal without its proving a financial burden. This volume appears to come fully up to the expectations of our members, and has been well received by the profession.

By vote of the Board, Mr. Edward C. Sherman has been continued as Editor of the JOURNAL.

The increase in membership will result in an increase of receipts from dues. The Treasurer estimates the receipts applicable to current expenses for next year at about $8 800, an increase of about $630 over the receipts of the past year.

A committee of the Board has given careful consideration to the needs of our younger members, and has recommended to the Board that several meetings be arranged for their particular benefit, and suggested that it may be wise to provide a prize, probably in the form of a medal, to encourage the preparation and presentation of papers by the younger members. The Board approves the recommendations of this committee, and suggests that they be put into effect.

The Committee on Membership, under the leadership of Frederic H. Fay, past president, has conducted a vigorous campaign for new members which has met with marked success. A total of 197 applications for membership has been procured.

A Committee on Social Activities was appointed early in the year, for the purpose of encouraging sociability at meetings. It was decided to try the experiment of having dinners before the regular meetings, and as this movement appeared to meet with general approval, several such dinners have been arranged, the details of which are given in the report of the committee, of which Edmund M. Blake is chairman. The dinners have been enlivened by music, story-telling and other forms of amusement, which have added much to their popularity.

An excellent series of papers has been provided by the Committee on Papers and Program, L. E. Moore, chairman, and the committee has not only obtained speakers for fully as many meetings as are usually held, but found itself at the end of the year with a surplus of material which is available for beginning the work of the next year.

For the Board of Government,
HARRISON P. EDDY, *President.*

REPORT OF THE TREASURER.

BOSTON, March 17, 1915.

To the Boston Society of Civil Engineers:

Your Treasurer presents the following report for the year 1914–15.

Detailed data are contained in the appended tabular statements; Table 1, profit and loss statements for four years; Table 2, comparative balance sheets; Table 3, investment of the Permanent Fund; and Table 4, statement of cash balance.

The revenue applicable to current expenses has been $8 171.57, nearly three hundred dollars greater than for the preceding year. The amount received for dues was, however, almost identical with that for the preceding year. The current expenses were $8 255.97, — an excess of $84.40 over revenue, — while the deficit of the preceding year was $774.44. The surplus in the current funds has been reduced to $451.31.

Owing to the large increase in membership, there should be a considerable increase in revenue next year. There will probably be available an income of about $8 800, which should be adequate to cover the expenses of the year, even if the Society's activities should be considerably increased, with resulting increased expense.

There has been added to the Permanent Fund during the year $2 819.34, and there has been expended from the fund, under the authority of a vote of the Society, $101.50, leaving a net gain in the Permanent Fund of $2 717.84. The present value of this fund, excluding the appropriation for altering and improving the rooms, and without allowance for accrued interest, is $34 582.13. This, however, is based upon the "book value" of our securities, and would be about seven hundred dollars less if current market prices be used. The statement of book value is based, in general, upon actual costs to us, and is, it is believed, a fairer statement of real values than present market prices would indicate. Including the unexpended balance of the appropriation for furnishing the rooms, — which will revert to the fund if not used by November next, — the present value of the Permanent Fund is in excess of $35 000. Of this appropriation $237.94 has been expended during the year, leaving a balance of $613.52.

Making approximate allowance for the amortization of bonds bought above or below par, the interest return upon the Permanent Fund is at the rate of 5.1 per cent.

In terminating five years of service as your Treasurer, I have thought it interesting to compare the financial condition of the Society during the last year of service of each of the last four treasurers, by tabulating the figures for current revenue, current expenses, value of Permanent Fund and total assets. The results are as follows:

Year.	Treasurer.	Period of Service. Years.	Current Revenue.	Current Expenses.	Value of Permanent Fund.	Total Assets.
1892	Henry Manley	12	$1 608.68	$1 420.58	$3 928.78	$4 412.52*
1906	Edw. W. Howe	14	5 270.77	5 706.90	18 813.33	18 833.53*
1910	Wm. S. Johnson	4	5 192.00	5 526.18	25 842.64	34 330.15
1915	Chas. W. Sherman	5	8 171.57	8 255.97	35 195.65	45 218.45

* Not including library and furniture.

Respectfully submitted,
CHARLES W. SHERMAN, *Treasurer.*

TABLE 1. — PROFIT AND LOSS STATEMENTS.

	1911–12.	1912–13.	1913–14.	1914–15.
Revenue:				
Members' Dues	$6 448.50	$6 443.00	$6 671.59	$6 675.58
Advertisements (net)	984.50	938.50	973.00	1 286.38
Sales of JOURNAL	8.25	9.40	33.55	130.28
Library Fines	5.56	7.28	8.01	6.42
Interest	22.81	95.30	159.25	72.91
Excursion Committee	....	....	52.94	....
Total Current Income	$7 469.62	$7 493.48	$7 898.34	$8 171.57
Entrance Fees	$410.00	$525.00	$315.00	$1 085.00
Contributions	100.00	100.00	100.00	100.00
Interest	1 301.72	1 277.70	1 515.45	1 634.34
Total Income Permanent Fund	$1 811.72	$1 902.70	$1 930.45	$2 819.34
Appropriation from Permanent Fund	....	$2 000.00	....	$101.50
Balance from Previous Appropriation	....	....	$1 051.40	851.46
Total Available from Appropriations	....	$2 000.00	$1 051.40	$952.96
Projecting Lantern, called	....	....	....	$400.00
Deficit for the year (current funds)	....	....	$774.44	84.40
	$9 281.34	$11 396.18	$11 654.63	$12 428.27

Expense:	1911–12.	1912–13.	1913–14.	1914–15.
Association of Engineering Societies	$2 010.00	$2 026.25	$1 564.38	....
Bulletin	763.83	783.49	687.75	....
Journal B. S. C. E. (incl. Editor's salary)	....	....	1 473.53	$3 206.36
Printing, Postage, Stationery	593.16	644.46	838.54	1 049.29
Rent (net)	920.00	1 320.75	1 632.00	1 620.00
Light	49.68	70.31	62.38	77.44
Salaries (except Editor)	992.00	1 248.50	1 358.00	1 554.00
Reporting	68.00	20.50	41.00	46.00
Stereopticon	130.00	134.50	107.50	79.00
Books	40.53	52.11	33.10	69.73
Binding	169.30	81.15	197.25	141.45
Periodicals	47.00	34.25	58.15	56.10
Incidentals and Repairs	84.94	87.77	62.40	104.41
Insurance	26.38	26.38	41.87	41.18
Telephone	65.24	66.27	50.82	43.53
Sanitary Section Incidentals,	14.24	22.55	64.90	49.35
Annual Meeting and Dinner,	220.82	73.09	73.38	72.90
Furniture	34.25	2.50	....	....
Navigation Congress	....	20.00	20.00	20.00
Students' Meeting	....	154.50	206.48	....
Catering	....	....	45.00	....
Excursions	....	....	38.00	7.50
Lantern Slides	....	....	16.35	....
Engineers' Joint Dinner	....	....	....	17.73
Total Current Expense	$6 229.37	$6 869.33	$8 672.78	$8 255.97
Books (special appropriation from Permanent Fund,	....	....	....	$101.50
Furniture	....	$573.15	$149.50	$225.34
Alterations in Rooms	....	375.45	50.44	12.60
Total expended from Appropriations	....	$948.60	$199.94	$339.44
Permanent Fund increase	$1 811.72	$1 902.70	$1 930.45	$2 717.84
Unexpended Balance of Appropriation	....	1 051.40	851.46	613.52
Increase for the year, Current Funds	1 240.25	624.15	....	....
Projecting Lantern, called	....	....	....	400.00
	$9 281.34	$11 396.18	$11 654.63	$12 428.27

NOTES ON TABLE I.

Dues.	The Secretary has paid over as dues	$6 685.58
	of which $68 is in advance for next year	68.00
	leaving as current dues	$6 617.58
	in addition to which there was paid in advance last year	58.00
	making the total dues for the current year	$6 675.58
Rent.	Paid for rooms, 12 months at $206.25	$2 475.00
	Paid for Chipman Hall, 8 x $15	120.00
	Paid for Lorimer Hall, 1 x 25	25.00
		$2 620.00
	Less rent from subtenants, collected by the Secretary	1 000.00
	Net rent for the year	$1 620.00
Advertising.		
	The Secretary has collected and paid over	$1 407.00
	from which commissions of	120.62
	have been deducted, leaving the net revenue from this source	$1 286.38

TABLE 2.— COMPARATIVE BALANCE SHEETS.

	March 19, 1913.	March 18, 1914.	March 17, 1915.
Assets:			
Cash	$353.26	$119.41	**$1 267.73**
Bonds and Notes	26 615.50	27 605.50	**29 191.75**
Stock	....	1 950.00	**1 950.00**
Coöperative Banks	5 315.80	3 545.72	**3 212.65**
Accounts Receivable (rent)	145.83	145.83	**145.83**
Library	7 500.00	7 500.00	**7 500.00**
Furniture	1 175.65	1 325.15	**1 950.49**
	$41 106.04	$42 191.61	**$45 218.45**
Liabilities:			
Permanent Fund	$29 933.84	$31 864.29	**$34 582.13***
Unexpended Appropriations	1 051.40	851.46	**613.52†**
Current Funds	1 310.15	535.71	**451.31**
Accounts Payable	135.00	115.00	**121.00**
Surplus	8 675.65	8 825.15	**9 450.49**
	$41 106.04	$42 191.61	**$45 218.45**

* Not including accrued interest and dividend, amounting on March 1 to $341.42.

† Will revert to Permanent Fund unless used prior to November 20, 1915.

Table 3. — Investment of the Permanent Fund, March 17, 1915.

	Par Value.	Actual Cost.	Present Market Value.*	Value as Carried on Books.
Bonds.				
American Tel. & Tel. Co. col. tr. 4%, 1929	$3 000.00	$2 328.75	$2 640.00	$2 737.50
Republican Valley R. R. 6%, 1919	600.00	616.50	606.00	618.00
Union Elec. Lt. & Pr. Co. 5%, 1932	2 000.00	2 050.00	2 000.00	2 050.00
Blackstone Valley Gas & Elec. Co. 5%, 1939	2 000.00	1 995.00	1 980.00	1 995.00
Dayton Gas Co. 5%, 1930	2 000.00	2 000.00	1 940.00	2 000.00
Milford & Uxbridge St. Ry. 5%, 1918	3 000.00	2 942.50	2 970.00	2 942.50
Railway & Lt. Sec. Co. 5%, 1939	3 000.00	3 000.00	2 910.00	3 000.00
Superior Water, Lt. & Pr. Co. 4%, 1931	3 000.00	2 505.00	2 470.00	2 505.00
Wheeling Elec. Co. 5%, 1941	3 000.00	2 895.00	2 820.00	2 895.00
Economy Lt. & Pr. Co. 5%, 1956	1 000.00	990.00	975.00	990.00
Tampa Elec. Co. 5%, 1933	2 000.00	2 000.00	1 960.00	2 000.00
Galveston-Houston Elec. Ry. Co. 5%, 1954	2 000.00	1 940.00	1 920.00	1 940.00
Northern Texas Elec. Co. 5%, 1940	2 000.00	1 932.50	1 860.00	1 932.50
Chicago & Northwestern Ry. 5%, 1987	1 000.00	1 102.50	1 102.50	1 102.50
	$29 600.00	$28 297.75	$28 153.50	$28 708.00
Note.				
Dallas Elec. Co. 5%, 1917	500.00	483.75	485.00	483.75
Stock.				
15 shares Am. Tel. & Tel. Co.	1 500.00	1 950.00	1 800.00	1 950.00
Total Securities	$31 600.00	$30 731.50	$30 438.50	$31 141.75

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* As of March 1, 1915.

Co-operative Banks:

25 shares Merchants Coöperative Bank, including interest to March	$1 388.05
25 shares Volunteer Coöperative Bank, including interest to January	1 051.55
25 shares Watertown Coöperative Bank, including interest to December	773.05
	$3 212.65
Total Value of Invested Funds	$34 354.40
Cash	227.73
Total Value of Permanent Fund	$34 582.13*

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* Not including accrued interest and dividend, amounting to $341.42, nor unexpended balance of appropriation, amounting to $613.52.

TABLE 4. — STATEMENT OF CASH BALANCE, MARCH 17, 1915.

Value of Current Funds	$451.31
Add Accounts Payable	121.00
	$572.31
Deduct Accounts Receivable	145.83
Cash on hand, Current Funds	$426.48
Unexpended Balance of Appropriation for Furnishing	613.52
Unappropriated Cash belonging to Permanent Fund	227.73
Total Cash on hand (in Old Colony Trust Company)	$1 267.73

REPORT OF THE AUDITING COMMITTEE.

BOSTON, MASS., March 15, 1915.

We hereby certify that we have this day examined the books and records of the Treasurer of the Boston Society of Civil Engineers for the year 1914–15; that all receipts are properly accounted for and that there are proper vouchers for all expenditures.

We have also examined the securities and investments of the Society's funds, have verified and compared the same with the books and found them all accounted for and properly carried.

We have compared the financial statement of the Treasurer with the books and find it to be correct.

LEONARD C. WASON,
JOHN N. FERGUSON,
Directors.

ANNUAL REPORT OF THE SECRETARY, 1914–1915.

BOSTON, MASS., March 17, 1915.

S. EVERETT TINKHAM, Secretary, *in account with the* BOSTON SOCIETY OF CIVIL ENGINEERS. *Dr.*

For cash received during the year ending March 17, 1915, as follows:

From entrance fees, new members and transfers:

93 members and associates	at $10 =	$930.00	
27 juniors	at 5 =	135.00	
4 juniors transferred to members	at 5 =	20.00	
Total from entrance fees			$1 085.00
From annual dues for 1914–15, including dues from new members		$6 595.58	
From back dues		22.00	
From dues for 1915–16		68.00	
Total from dues			6 685.58
From rents			1 000.00
From advertisements			1 407.00
From sale of JOURNALS, reprints and cuts			194.78
From contribution to building fund			100.00
Total			$10 472.36

The above amount has been paid to Treasurer, whose receipts the Secretary holds.

We have examined the above report and found it correct.

JOHN N. FERGUSON,
LEONARD C. WASON,
Auditing Committee of Directors of the
Boston Society of Civil Engineers.

ANNUAL REPORT OF LIBRARY COMMITTEE, 1914–15.

BOSTON, MASS., March 17, 1915.

To the Boston Society of Civil Engineers:

The Library Committee submits herewith its annual report for the year ending March 17, 1915.

Since the last report 280 volumes bound in cloth and 460 volumes bound in paper have been added to the library, the total number of accessions being 740.

There are now 7 780 cloth-bound volumes in the library. Those bound in paper still number about 2 000, the additions for the year, as usual, nearly balancing the number bound.

During the year 296 books have been loaned to members, and fines to the amount of $6.42 have been collected.

A considerable amount of binding has been done, and the files of bound periodicals and society publications are in much better shape than a year ago.

Files of the following society publications are now complete: Transactions of the American Institute of Mining Engineers, Transactions of the Canadian Society of Civil Engineers, Journal of the Western Society of Engineers, and Proceedings of the Engineers' Society of Western Pennsylvania. Thirty-nine volumes of the Minutes of Proceedings of the Institution of Civil Engineers (London) have been added during the year, the earlier volumes by purchase, and the file is now complete from and including volume 23 to date. As this set of books is frequently consulted, it is hoped that the remaining volumes may be secured. A nearly complete set of the Transactions of the American Society for Testing Materials, presented to the Society by Mr. L. C. Wason, is now on the shelves, and the committee recommends that the volumes needed to complete the set be purchased.

Fifteen new engineering books have been bought for Section 10 during the year, and three others, Volumes I and II of "American Sewerage Practice," by Messrs. Leonard Metcalf and Harrison P. Eddy, and Part I of "Concrete-Steel Construction," by Messrs. Henry T. Eddy and C. A. P. Turner, have been presented to the library by the authors.

The need of a good encyclopedia has long been felt, and the committee has recently purchased a set of the Encyclopædia Britannica, ninth edition, in twenty-five volumes, and a set of the New International Encyclopædia is being received as the respective volumes come from the press. The latter set, when complete, will number twenty-four volumes. To the indexes available in the reading room the Industrial Arts Index has been added, which publication comes to us highly recommended and seems to be appreciated by those using the library.

Mr. Clemens Herschel, continuing his generous policy of past years, has added a number of volumes to both the Herschel Special Library and the general library.

A special case to accommodate both the recently acquired sets of encyclopædias, an accession case and a filing cabinet have been added to the furnishings of the library.

An increase in the activities of the Society along various lines has been attended by a corresponding increase in clerical work, which for a time seriously handicapped the work of recataloguing the library. The pressure has been relieved, however, by the employment of an assistant, and the work is again making good progress.

Among the immediate needs of the library may be mentioned an up-to-date dictionary of the English language and a new Boston city directory. The committee recommends that these two books be purchased; also that a sum not less than one hundred dollars be appropriated for the purchase of current engineering books during the year.

Respectfully submitted,

S. E. TINKHAM,
FREDERIC I. WINSLOW,
HENRY F. BRYANT,
Committee on Library.

Report of the Executive Committee of the Sanitary Section.

Boston, Mass., March 3, 1915.

The past year has been one of activity in the Sanitary Section. Seven meetings have been held, as follows:

March 4, 1914. — "The Collection and Treatment of Sewage in Their Relation to the City of Philadelphia," George S. Webster.

May 11, 1914. — "The Development and Present Status of Sewage Purification in England," Arthur J. Martin.

June 3, 1914. — Excursion to Fitchburg, Mass., Sewage Treatment Works.

November 27, 1914. — "The Industrial Wastes of Chicago, with Particular Reference to the Packing Industry," Langdon Pearse.

December 9, 1914. — "The Economic Depth of Trickling Filters," Harrison P. Eddy.

"A Study of Depth of Filter Material in Connection with Trickling Filter Efficiency," H. W. Clark.

January 6, 1915. — "Diatoms," F. F. Forbes and Dr. J. W. M. Bunker.

February 3, 1915. — "Garbage Disposal at Worcester, Mass.," Dr. Frederic Bonnet, Jr.

"Garbage Reduction Plants at Cleveland, Schenectady and New Bedford," W. J. Springborn.

The June excursion was held in Fitchburg and included an inspection of the sewage treatment works. The city entertained the Section at lunch and with a trolley trip to Whalom Park and Wachusett Lake. The attendance was 65.

One important piece of committee work has been accomplished in the "Toilet Regulations for Industrial Establishments," adopted by the Section December 9, 1914, and published in the February number of the Journal.

With the authority and advice of the Executive Committee, the chairman has appointed the following special committees to study and report upon:

"Methods of Design and Construction and Results of Operation of Submerged Pipe Lines for Outfall Sewers," Hiram A. Miller, chairman; DeWitt C. Webb, George A. Sampson, Edgar S. Dorr.

"Methods of Design and Construction and Results of Operation of Inverted Siphons for Carrying Sewage Only and for Storm Water," William S. Johnson, chairman; Rufus M. Whittet, Dwight Porter.

Four of the Boston meetings have been held in the Society Library, and the other two at the Engineers' Club. They have been well attended, as the following figures will show:

	Record of Attendance.	
	Dinner.	Meeting.
March (1914) annual meeting	49	80
May special meeting	25	46
June excursion	..	65
November special meeting	..	55
December meeting	..	48
January	..	56
February	..	30
Average attendance (6 meetings) not including excursion	..	53

Four new members have been added, making the present total membership of the Sanitary Section 177, of which 13 are members of the Section only, 3 are juniors and 1 an associate. There were 18 former members reinstated.

The fine projection lantern presented to the Society by Mr. John R. Freeman has proved of great value in the meetings of the Section, and because of the attachments provided it has been possible to present subjects which would otherwise have been impracticable.

Respectfully submitted for the Executive Committee,
FRANK A. MARSTON, *Clerk*.

REPORT OF THE COMMITTEE ON SOCIAL ACTIVITIES.

BOSTON, MASS., March 17, 1915.

TO THE BOARD OF GOVERNMENT, BOSTON SOCIETY OF CIVIL ENGINEERS:

Gentlemen, — The Committee on Social Activities, appointed by you in the spring of 1914, has the honor to report as follows:

Five informal dinners have been held during the year on June 10, October 21, November 18, and December 16, 1914, and on January 27, 1915. No informal dinner was arranged for February, 1915, on account of the annual dinner of the mechanical, electrical and civil engineers which came during that month. These dinners have always preceded regular meetings of the Society, the members attending the dinner going from there direct to the meeting.

The committee has been made up of fifteen members, and all have worked in harmony and have never failed to respond to the call of the chairman. We started out with a slogan of "A Membership of One Thousand with One Hundred Per Cent. of Good Fellowship by 1915," with the purpose of making every effort possible to bind the membership of the Society more closely together and to build up and foster a social spirit based upon that good-fellowship known best to engineers. We felt that our efforts would also tend to help out the Committee on Membership. The success of what we have tried to do must be judged by the Society.

The record of attendance at the dinners is:

Date.	Members.	Guests.	Total.
June 10..................	58	6	64
October 21...............	66	48	114
November 18.............	74	15	89
December 16.............	63	4	67
January 27...............	71	12	83

The average attendance was 84.

The June 10 dinner was held at the Crawford House, with Mr. Charles H. Eglee as toastmaster.

The October 21 dinner was held in Chipman Hall, with Mr. Edwin R. Olin as toastmaster. Ladies were present at this dinner.

The November 18 dinner was held at the City Club, with Mr. George A. Carpenter as toastmaster.

The December 16 dinner was held at the City Club, with Mr. Charles H. Eglee as toastmaster.

The January 27 dinner was held at the City Club, with Mr. William E. McKay as toastmaster.

Mr. Edwin R. Olin acted as choragus at all of the dinners, and the improvement in singing was very noticeable under his guidance.

The personnel of the committee was as follows: Lawrence B. Manley, George A. Carpenter, John N. Ferguson, Henry A. Symonds, Charles H. Gannett, Clarence T. Fernald, Edwin R. Olin, Frederic C. H. Eichorn, George A. Sampson, Charles H. Eglee, Herbert N. Cheney, Leslie H. Allen, Edwin D. Hayward and Harold Robinson.

Respectfully submitted for the Committee,
EDMUND M. BLAKE,
Chairman Committee on Social Activities.

REPORT OF THE EDITOR OF THE JOURNAL.

BOSTON, MASS., January 18, 1915.

TO THE BOARD OF GOVERNMENT OF THE
BOSTON SOCIETY OF CIVIL ENGINEERS:

Gentlemen, — I have the honor to submit the following report on the JOURNAL OF THE BOSTON SOCIETY OF CIVIL ENGINEERS for the year 1914.

The JOURNAL was published monthly, except in July and August, ten numbers being issued. As our Society had furnished an average of about 300 pages a year to the *Journal of the Association of Engineering Societies*, and at the same time had published the *Bulletin*, the Committee on Publications estimated, in October, 1913, that we might expect to print a total of about 760 pages a year; that we would probably use about 40 cuts and 5 inserted plates; and that the total cost would be about $2 500 a year. Deducting the income from the amount of advertising which the *Bulletin* contained, this would correspond with a total net cost of about $1 600.

We have considerably exceeded the estimates, having printed a total of 914 pages, with 134 cuts and 26 inserted plates, at a gross cost of $4 285.74. The amount of advertising has been increased about 66 per cent., and the income from advertisements for the year was $1 419.50. Deducting that amount, together with the sums received from subscriptions, sales of JOURNALS, extra reprints and cuts, the total net cost of the JOURNAL was $2 660.93, or an average of $266.09 per issue. From this total might also be deducted the small balance credited to us at the Post-Office, although it is practically a negligible amount.

The January number, containing 26 inserted plates, was an exceptionally costly one, $1 227.54 having been spent on that issue alone. Neglecting this issue, the net cost was about $1 778, or an average net cost of $177.80 for the nine subsequent issues.

It appears therefore, that, excepting the January JOURNAL, the average net cost of publication has closely approximated the estimate made by the

Month.	Pages of				Cuts in		Cost of							
	Index.	Proc.	Papers.	Adv.	Proc.	Papers.	Papers, Proc., Index.	Cuts.	Adv'ts.	Reprints.	Postage, Wrapping, Mailing.	Editing.	Holding Type.	Adv. Comm.
Jan.		19	30	14		26	$632.50	$417.20	$45.10	$45.00	$37.74	$50.00*	(Copyright fees and Editor's Incidentals.)	
Feb.		9	54	14		16	172.20	16.65	15.93	32.94	13.38	25.00		
Mar.		15	94	20	1	31	292.77	51.40	35.70	37.50	14.04	25.00		
April		33	84	20	1	9	340.24	15.25	14.65	23.50	14.16	25.00		
May		16	28	20		0	140.75	8.10	24.40	14.00	14.01	25.00		
June		16	92	20		40	373.18	40.25	23.36	22.49	14.06	25.00		
Sept.		18	36	20		2	158.62	2.75	18.95	16.00	14.16	25.00		
Oct.		13	62	20		21	190.67	1.75	17.65	19.31	13.94	25.00		
Nov.		10	28	20		2	116.30	1.60	20.75	7.50	13.84	25.00		
Dec.	8	21	40	20		11	193.94	18.00	17.70	5.50	14.12	25.00		
Total	8	170	548	188	2	158	$2 611.17	$572.95	$234.19	$223.74	$163.45	$325.00	$41.59	$113.75

Total pages = 914.
Total cuts = 160.

Total cost	$4 285.74
Deduct receipts	1 624.81
Net cost	$2 660.93

*Includes December, 1913.

committee, the larger gross cost being offset by the increase in advertising receipts.

The number of pages and cuts printed, and the details of the costs, are shown in the table on preceding page.

The total number of copies of the JOURNAL mailed in December was 987. Of these, 49 went in exchange for other publications and 6 were sent to libraries. Twelve hundred copies of each number have been printed, so that a good supply of all issues is on hand.

Respectfully submitted,

EDWARD C. SHERMAN, *Editor*.

APPLICATIONS FOR MEMBERSHIP.

[April 6, 1915.]

THE By-Laws provide that the Board of Government shall consider applications for membership with reference to the eligibility of each candidate for admission and shall determine the proper grade of membership to which he is entitled.

The Board must depend largely upon the members of the Society for the information which will enable it to arrive at a just conclusion. Every member is therefore urged to communicate promptly any facts in relation to the personal character or professional reputation and experience of the candidates which will assist the Board in its consideration. Communications relating to applicants are considered by the Board as strictly confidential.

The fact that applicants give the names of certain members as reference does not necessarily mean that such members endorse the candidate.

The Board of Government will not consider applications until the expiration of twenty (20) days from the date given.

ALMY, HORACE THOMAS, Providence, R. I. (Age 33, b. Tiverton, R. I.) Had grammar school education and two years' private study. From Jan., 1899, to 1902, with F. M. Metcalf, civil engineer, New Bedford; from 1902 to 1903, with Erastus Worthington on water works and sewer design and construction; later in the same year, re-entered office of F. M. Metcalf, in charge of general engineering work; from Feb., 1913, to date, assistant engineer with Bridge Dept., Providence. Refers to F. B. Bourne, W. D. Bullock, E. W. Ross and I. S. Wood.

Bliss, Edwin Packard, Malden, Mass. (Age 43, b. Boston, Mass.) Educated in public schools of Salem and at Mass. Inst. of Technology. From 1898 to 1899, draftsman with N. E. Gas & Coke Co. on work of laying out Everett plant; 1899, draftsman on structural steel, Elevated Div., Boston Elevated Ry. Co.; from 1899 to 1900, assistant engineer with N. J. Steel & Iron Co., Boston office; from 1900 to 1902, engineer with Jones & Laughlin Steel Co., Boston office; from 1902 to date, partner in contracting engineering firm of H. P. Converse & Co. Refers to J. E. Carty, L. S. Cowles, F. H. Fay, J. N. Ferguson and F. W. Hodgdon.

Borden, James Edgar, Fall River, Mass. (Age 47, b. Fall River, Mass.) Graduate of Mass. Inst. of Technology, 1890. From 1890 to 1891, with Met. Sewerage Comm.; from 1891 to 1892, with Rumford Falls Power Development Co.; from 1892 to date, with Fall River Engrg. Dept. in various capacities; since June, 1913, has been city civil engineer. Refers to H. K. Barrows, P. D. Borden, F. H. Fay, W. E. Noble, A. L. Shaw and C. M. Spofford.

Bryant, Chauncey Davis, Newton, Mass. (Age 23, b. Chicopee, Mass.) Graduate of Mass. Inst. of Technology, sanitary engineering course, 1914. Employed as draftsman for six weeks, during summer vacation of 1914, by Metcalf & Eddy; is now employed as draftsman by Robert Spurr Weston. Refers to F. A. Marston, D. L. Porter, F. L. Preble, G. A. Sampson, C. W. Sherman and R. S. Weston.

Bullard, Albert Ovington, Sterling, Mass. (Age 41, b. West Boylston, Mass.) From Dec., 1895, to 1908, with Met. Water & Sewerage Board, as apprentice, rodman, etc., and finally as assistant engineer in charge of construction; was for several months with John R. Freeman, Providence, on reports of hydro-electric development studies in California; from 1909 to date, in general contracting work in New England. Refers to E. R. B. Allardice, N. S. Brock, R. H. Hosmer and M. J. Locke.

Burroughs, Russell, Concord, N. H. (Age 40, b. Dunbarton, N. H.) Educated in public schools of Dunbarton and Concord, N. H., and at Pembroke Academy, Pembroke, N. H. From 1892 to 1893, chainman on construction of New Boston Branch of B. & M. R. R.; from 1893 to 1899, engaged in municipal work for cities of Concord, Rochester and Somersworth, N. H.; from 1899 to 1904, resident engineer on construction of Manchester & Milford Branch and Concord and Manchester Electric Branch of B. & M. R. R.; from 1904 to 1914, assistant engineer, M. of W. Dept., B. & M. R. R.; from 1914 to date, acting division engineer, M. of W., on 2d division, B. & M. R. R. Refers to A. B. Corthell, W. B. Howe, F. W. Lang and J. W. Storrs.

Chase, Horace H., Brockton, Mass. (Age 39, b. Weymouth, Mass.) Was for nine years in city engineer's office, Brockton; is now principal assistant to F. A. Barbour, sanitary engineer, with whom he has been for eleven years; elected a member of the Sanitary Section, June 9, 1906, and now wishes to be transferred to grade of member. Refers to F. S. Bailey, F. A. Barbour, E. G. Bradbury, B. R. Felton, F. H. Snow and H. T. Stiff.

Chevalier, Charles Russell, St. Johnsbury, Vt. (Age 34, b. North Hampton, N. H.) Graduate of Hampton Academy. From June, 1899, to 1902, with B. & M. R. R. as chainman, transitman, draftsman, chief-of-party, etc.; from September, 1902, to June, 1903, transitman with N. Y. C. & H. R. R. R.; from June, 1903, to November, 1911, with N. Y., N. H. & H. R. R.; began as transitman, but was promoted to position of assistant engineer, M. of W. Dept., in 1906, and again in 1910, to position of resident engineer in charge of proposed double track tunnel at Fall River; from November, 1911, to date, with B. & M. R. R.; now holds position of division engineer, M. of W. Dept., at St. Johnsbury, Vt. Refers to S. P. Coffin, A. B. Corthell, B. W. Guppy, H. L. Ripley, B. A. Robinson and L. W. Tucker.

Clapp, Arthur Schuyler, Norfolk, Mass. (Age 33, b. Milton, Mass.) Educated in public schools. From April, 1900, to Nov., 1912, with B. & M. and N. Y., N. H. & H. railroads; from Nov., 1912, to date, in private practice as engineer and contractor. Refers to H. W. Hayes, H. C. Higgins, C. B. Humphrey, G. T. Sampson and H. L. White.

Clapp, Frank Lemuel, Boston, Mass. (Age 44, b. Boston, Mass.) Student at Mass. Agricultural College, 1892–96. From 1890 to 1892, rodman with E. W. Bowditch, Boston; from 1896 to 1901, rodman and instrumentman with Dist. Dept., Met. Water Bd., Boston; from 1901 to 1906, draftsman, assistant engineer and engineer on construction with Robert A. Cairns, city engineer, Waterbury, Conn.; from 1906 to 1914, with Board of Water Supply, City of New York; from 1914 to 1915, in private practice and with Bay State St. Ry. Co. Refers to S. D. Dodge, J. N. Ferguson, W. E. Foss, H. W. Horne and J. L. Howard.

Clapp, Frederick Otis, Providence, R. I. (Age 42, b. Providence, R. I.) Received degrees of A.B. and A.M. from Brown University in 1895 and 1897, respectively; received degree of S.B. from Mass. Inst. of Technology, 1899. From 1895 to 1897, instructor in mathematics, Brown University; from 1899 to 1902, in city engineer's office, Providence; from 1902 to 1909, in charge of construction of slow sand filtration plant for Providence Water Works; from 1909 to date, in city engineer's office, on miscellaneous work connected with water and sewer department. Refers to C. F. Allen, J. W. Bugbee, W. D. Bullock, O. F. Clapp, H. P. Eddy, Dwight Porter, G. F. Swain and I. S. Wood.

Clark, Frederick Howe, Springfield, Mass. (Age 47, b. Northfield, Vt.) Graduate of Norwich University, degree of B.C.E., 1889. From 1889 to 1900, with Engineering Dept. of City of Worcester, Mass.; from 1900 to 1908, engineer in charge of reservoir construction, Water Dept., Worcester; from 1908 to 1910, first assistant to city engineer, Worcester; from 1910 to 1913, street commissioner of Worcester; from 1913 to date, superintendent of streets and engineering, Springfield. Refers to Joshua Atwood, A. W. Dean, H. P. Eddy, L. K. Rourke and D. C. Webb.

Collins, Harry Bumstead, Brookline, Mass. (Age 25, b. Gloucester, Mass.) Student in hydraulics and reinforced concrete at Boston Y. M. C. A.

and Franklin Union; has passed civil service examination for senior transitman. During summers of 1906–1909, with Brookline Engineering Dept.; from 1910 to date, with Brookline Engineering Dept. as senior transitman. Refers to H. F. Bryant, F. F. Forbes, H. W. French, F. A. Leavitt, H. A. Varney and C. J. Wallace.

Deming, Guy Spalding, Lowell, Mass. (Age 27, b. New York, N. Y.) Graduate of Harvard College, 1910, with degree of A.B.; student for two years at Graduate School of Applied Science, Harvard University, civil engineering course. During summers of 1910 and 1911, assistant instructor in plane and railroad surveying at Harvard Engineering Camp; from June, 1912, to date, assistant to Arthur T. Safford, consulting hydraulic engineer, Lowell, in his consulting work and conduct of course on Water Power Engineering at Graduate School of Applied Science, Harvard University; is now resident engineer in charge of construction, slow sand filter plant, Gardiner, Me. Refers to H. J. Hughes, L. J. Johnson, G. W. Mansur and A. T. Safford.

Denley, Alfred N., Winchester, Mass. (Age 28, b. Rockland, Mass.) Student at Rindge Manual Training High School, Cambridge, 1906; student at Lowell Inst., in mechanical engineering course, 1908, and in electrical courses, 1909. From 1906 to 1907, draftsman with Blake & Knowles Pump Works, Cambridge; from 1907 to 1909, draftsman with C. H. Tenney Co., Boston; from 1909 to 1915, draftsman and resident engineer with Chas. T. Main. Refers to F. M. Gunby, J. F. Osborn, H. L. Robinson, H. E. Sawtell and W. F. Uhl.

Devine, Walter A., Randolph, Mass. (Age 27, b. Randolph, Mass.) Received public school education; also attended Thayer Academy for one year and took one-year structural course at Franklin Union. From April, 1906, to date, with Engineering Dept., Brookline, Mass., on design and construction work. Refers to F. F. Forbes, H. W. French, F. A. Leavitt, E. H. Rockwell, H. A. Varney and C. J. Wallace.

Donovan, Frederick Philomen, Roxbury, Mass. (Age 24, b. Boston, Mass.) Graduate of Harvard College, 1911; student at Harvard Graduate School of Engineering, 1912. From 1912 to date, engineer with Hugh Nawn Contracting Co. Refers to S. T. Connolly, F. C. H. Eichorn, J. T. Frame, G. W. Lewis and Hugh Nawn.

Durant, William B., Turners Falls, Mass. (Age 25, b. Cambridge, Mass.) Student at Harvard College, 1906 to 1909, and at Harvard Graduate School of Applied Science, 1909 to 1910, civil engineering course. From 1910 to 1911, with N. Y., N. H. & H. R. R., as surveyor and inspector; from 1911 to date, engineer with Turners Falls Co., on dam design and canal excavation. Refers to H. J. Hughes, H. A.Moody, A. T. Safford and H. D. Woods.

Farwell, Joseph Willard, Jr., Canton, Mass. (Age 25, b. Millis, Mass.) Student at Mass. Inst. of Technology, 1908 to 1910. From Sept., 1910, to June, 1913, with Maintenance of Way Dept., N. Y., N. H. & H. R. R., chiefly as rodman, but as assistant draftsman during last three months; from

June, 1913, to Aug., 1914, in private business; from Aug. to Nov., 1914, inspector with Duxbury Fire & Water District; from Nov., 1914, to date, transitman with Maintenance of Way Dept., N. Y., N. H. & H. R. R. Refers to L. H. Allen, J. N. Ferguson, C. V. Reynolds, G. T. Sampson and A. S. Tuttle.

Foster, Harry C., Gloucester, Mass. (Age 43, b. Swampscott, Mass.) Received education in Gloucester public schools and from special course at Mass. Inst. of Technology, 1893. From 1893 to 1905, with Boston Street Commissioners, in charge of division for six years; in business for two years under firm name of Sellew & Foster; with Boston Consolidated Gas Co., in charge of construction of gas holder for one year; with Boston Elevated Ry. Co., street laying-out division, for six years. Refers to Clifford Foss, C. B. Humphrey, C. F. Knowlton, H. C. Mildram, A. L. Plimpton, E. H. Rogers, F. E. Sherry and F. O. Whitney.

Fowler, Samuel Jones, Cambridge, Mass. (Age 64, b. Westfield, Mass.) Educated at Westfield High, Normal and Academy; also at Dresden and Jena, Germany, and Liége, Belgium. Has served as general chemist for Laflin & Rand Powder Co., expert for Rendrock Powder Co., designer for Riverside Worsted Mills, treasurer of Westfield Gas Co., and manager of Springfield Gas Co.; is now treasurer and agent for Charlestown Gas & Electric Co. Refers to H. N. Cheney, J. W. Ellis, F. H. Fay, N. W. Gifford, J. A. Gould, W. E. McKay, I. E. Moultrop, Hugh Nawn and S. E. Tinkham.

Gage, Stephen DeMeritte, Providence, R. I. (Age 41, b. Durham, N. H.) Graduate of Mass. Inst. of Technology, 1896. From July, 1896, to May, 1914, with Mass. State Board of Health at Lawrence Experiment Station; was biologist and principal assistant during greater portion of this time; from June, 1914, to date, chemist and sanitary engineer to Rhode Island State Board of Health; elected a member of Sanitary Section, March 2, 1904, and now wishes to be transferred to grade of member. Refers to G. A. Carpenter, H. W. Clark, H. P. Eddy, R. A. Hale, A. D. Marble and R. S. Weston.

Giblin, John Francis Aloysius, Boston, Mass. (Age 25, b. Boston, Mass.) Graduate of Harvard College with degree of A.B., 1911; student in Graduate School of Applied Science, Harvard College, 1910–1911; student in building course, Lowell Inst., 1914–15. From June to Oct., 1911, and from July to Sept., 1912, rodman and draftsman with Sewer Div., Public Works Dept.; from Sept., 1912, to date, assistant with Boston Transit Comm. Refers to F. C. H. Eichorn, G. D. Emerson, J. A. McMurray, P. H. Mosher, Hugh Nawn and J. M. Shea.

Harty, John Joseph, Jr., Boston, Mass. (Age 25, b. Greenville, Miss.) Student at Mass. Inst. of Technology, 1910–13. From June, 1906, to Sept., 1910, with J. J. Harty, general contractor, Greenville, Miss.; from June to Sept., 1912, with N. E. Concrete Construction Co., Boston; from June, 1913, to Sept., 1914, with Monks & Johnson, engineers and architects, Boston; from Nov., 1914, to date, with Fay, Spofford & Thorndike, consulting engineers, Boston. Refers to F. H. Fay, Mark Linenthal, J. R. Nichols, C. M. Spofford and S. H. Thorndike.

Horne, Ralph Warren, Malden, Mass. (Age 26, b. Malden, Mass.) Graduate of Mass. Inst. of Technology, 1910. Assistant at Mass. Inst. of Technology, during collegiate year of 1911; from 1911 to 1915, assistant engineer and designer for Metcalf & Eddy; at present employed by Fay, Spofford & Thorndike. Refers to H. P. Eddy, F. H. Fay, Leonard Metcalf, C. W. Sherman, C. M. Spofford and S. H. Thorndike.

Joy, Charles Frederick, Jr., Fall River, Mass. (Age 28, b. Chelsea, Mass.) Graduate of Mass. Inst. of Technology, civil engineering course, 1910. During summer of 1909, timekeeper and material man with J. W. Bishop Co.; with B. & M. R. R., M. of W. Dept., for about nine months; from Jan. to March, 1912, assistant engineer on Neponset River preliminary surveys; from April to Dec., 1912, inspector of sewer construction, Attleboro, Mass.; from Jan. to April, 1913, assistant engineer and draftsman with Bay State St. Ry. Co., at Newport, R. I.; from May, 1913, to May, 1914, assistant engineer on Neponset River Improvement; from May to Dec., 1914, resident engineer on construction of sewage disposal plant for Franklin, Mass.; is now with Hanscom Construction Co., as engineer on construction of intercepting drain at Fall River, Mass. Refers to E. M. Blake, N. L. Hammond, Dwight Porter, A. L. Shaw, C. M. Spofford and J. J. Van Valkenburgh.

Lamson, John Stevens, Arlington, Mass. (Age 49, b. Cambridge, Mass.) Graduate of Tufts College, civil engineering course, 1889. From 1889 to 1891, taught at Tufts College; from 1891 to March, 1914, with City of Boston, first in city engineer's office and later in Public Works Dept.; from Sept., 1914, to date, with Fay, Spofford & Thorndike. Refers to M. T. Cook, E. W. Howe, Theodore Parker, C. M. Spofford and S. H. Thorndike.

Langdon, George Woodward, Jr., Brookline, Mass. (Age 26, b. Clinton, Mass.) Graduate of Newburyport High School, 1908; student at Brown Univ., 1908 to 1912. During summers of 1908 and 1909, engineer in connection with auxiliary water supply, City of Newburyport; engineer on land development scheme in Rhode Island for two months in 1912; from June, 1913, to Feb., 1914, resident engineer with Mass. Highway Comm. on construction in Wellesley and Natick and on construction of concrete bridge at Tyngsboro; since Feb., 1914, has been engaged in non-technical work; is now assistant general manager of Keystone Stoker Co. Refers to J. B. Blood, H. B. Drowne, Harold Parker, A. E. Tarbell and L. D. Thorpe.

Leary, Herbert Daniel, East Boston, Mass. (Age 28, b. East Boston, Mass.) Graduate of Mechanic Arts High School, 1904; took post-graduate course, 1905; student at Tufts College, 1906, and at University of Maine, 1907, civil engineering course. From June, 1910, to July, 1911, engineering inspector with Mass. Highway Comm.; from July, 1911, to April, 1913, with Lucius Engineering Co., Pittsburgh, Pa., as engineer and estimator on railroad bridge construction; from April, 1913, to May, 1914, with Turners Falls Co. on large hydro-electric development; from May, 1914, to date, with Boston Transit Comm. Refers to E. S. Davis, F. C. H. Eichorn, G. D. Emerson and J. T. Frame.

Lynch, Arthur Vincent, Boston, Mass. (Age 27, b. Boston, Mass.) Graduate of Mechanic Arts High School; student at Y. M. C. A. evening school for two years and at Franklin Union for three years. With French & Bryant, engineers, for one year; has been seven years with Boston Transit Comm., as inspector and transitman. Refers to C. L. Brown, W. W. Davis, G. D. Emerson, B. A. Rich and P. B. Walker.

McMullen, Ernest William, Jamaica Plain, Mass. (Age 25, b. Boston, Mass.) Graduate of Mechanic Arts High School, 1908; has taken courses at Y. M. C. A. evening school. From 1908 to 1911, with Francis W. Wilson, consulting engineer, on concrete design and in charge of drafting room; from 1911 to date, with Monks & Johnson; has served as resident inspector on buildings and is now in charge of squad of men working on design of concrete building. Refers to Randolph Bainbridge, Granville Johnson, Mark Linenthal and J. R. Nichols.

Mawney, Robert Wheaton, Pittsfield, Mass. (Age 35, b. East Greenwich, R. I.) Student at Brown Univ., civil engineering course, 1900 to 1904. During college course worked for Ernest H. Brownell, C.E., and Samuel M. Gray, C.E., both of Providence; from 1905 to 1906, with steam heating firm in Providence; from 1906 to 1907, with Lockwood, Greene & Co., on water-power development and surveys in North and South Carolina and in Georgia; from 1907 to 1909, draftsman with Charles River Basin Comm.; from 1909 to date, assistant engineer with City of Pittsfield, chief work in this capacity having been on design of water works and bridges. Refers to T. F. Dorsey, R. W. Emerson, A. A. Fobes, H. A. Miller and E. C. Sherman.

Maynard, Arthur J., State Farm, Mass. (Age 46, b. Fall River, Mass.) Educated in public schools. During year 1886, timekeeper and foreman with Brightman & Place; from 1887 to 1889, superintendent of building construction with Beattie & Wilcox; from 1889 to date, superintendent of construction at Massachusetts State Farm; has built 95 per cent. of State Farm buildings. Refers to H. B. Andrews, W. M. Bailey, E. S. Larned, E. F. Rockwood, S. E. Thompson and L. C. Wason.

Miller, Buckingham, Newton Highlands, Mass. (Age 26, b. Des Moines, Ia.) Graduate of Newton High School, 1906; student for three years at Yale College. Previous to Sept., 1910, worked five summers as rodman; from Sept., 1910, to Jan., 1912, rodman and instrumentman for MacArthur Bros. Co. and Winston & Co., at Ashokan Dam; Jan. to June, 1912, assistant engineer, Board of Water Supply of New York City, on city aqueduct tunnel; from June, 1912, to Sept., 1914, chief-of-party and inspector for Directors of Port of Boston; Sept. to Dec., 1914, assistant engineer with Percy M. Blake on Mansfield water supply construction. Refers to J. N. Ferguson, F. W. Hodgdon, J. L. Howard and H. A. Miller.

MORRILL, FRED WILLIAM, West Roxbury, Mass. (Age 30, b. Haverhill, Mass.) Graduate of Mass. Inst. of Technology, 1907, civil engineering course. During year 1907–08, with contracting company on construction work and later acted as inspector on bridge; from June, 1908, to June, 1911, taught railroad and bridge engineering at Pei Yang Univ., Tientsin, China; from Oct. to Dec., 1911, with New York Central Ry. on valuation work; from Dec., 1911, to Feb., 1914, designer and concrete inspector with J. R. Worcester & Co.; in Feb., 1914, entered employ of Quequechan River Comm., Fall River; is now employed by Fay, Spofford & Thorndike, on design of concrete structures for proposed improvement of Quequechan River. Refers to F. H. Fay, H. F. Sawtelle, C. M. Spofford and S. H. Thorndike.

O'CONNOR, JAMES HENRY, Roslindale, Mass. (Age 27, b. Holliston, Mass.) Student at Harvard College, 1907–08. From 1910 to 1911, rodman with Public Works Dept., City of Boston; from 1911 to 1912, draftsman, High Pressure Fire Service, Boston; from 1912 to date, assistant with Boston Transit Comm. Refers to F. C. H. Eichorn, L. B. Manley, C. V. Reynolds and R. E. Rice.

PARKE, ROBERT HEYWOOD, Fitchburg, Mass. (Age 39, b. Monson, Mass.) Graduate of Tufts College, 1898, with degree of B.S. in electrical engineering; received degree of M.S. from Tufts, 1903. Entered employ of Fitchburg R. R., Sept., 1899, as transitman; within a year was advanced to engineer's assistant in charge of construction of new dock between U. S. Navy Yard and Railroad Pier 7, Charlestown; was for several years in charge of surveys and construction work on different divisions of B. & M. R. R.; transferred to Fitchburg, in charge of division office, 1903; in charge of division office, Greenfield, from 1906 to 1912; from 1912 to date, assistant engineer, maintenance of way department, with headquarters at Fitchburg. Refers to H. Bissell, A. B. Corthell, H. T. Gerrish, B. W. Guppy, L. C. Lawton, F. B. Rowell and J. P. Snow.

PUTNAM, HAROLD W., Lynn, Mass. (Age 22, b. Lynn, Mass.) Student at Boston Y. M. C. A. Co-operative Engineering School, 1911 to 1913. From Nov., 1912, to June, 1914, with Aspinwall & Lincoln; from June to Dec., 1914, with Mass. Highway Comm.; from March, 1915, to date, with Metropolitan Park Comm. Refers to Thomas Aspinwall, H. P. Burden, J. N. Ferguson, E. H. Lincoln, F. D. Sabin and T. W. Souther.

RHODES, RALPH FARNHAM, Newport, R. I. (Age 35, b. Meadville, Miss.) Received degree of B.S. in 1900 and degree of C.E. in 1901 from Louisiana State University. From 1901 to 1904, track apprentice, chainman, rodman, and instrumentman with Y. & M. V. R. R.; in 1904, chief-of-party on preliminary railroad surveys in Louisiana and Mississippi; from 1904 to 1905, engineer for Park Comm., Memphis, Tenn.; from 1905 to 1907, superintendent for contractor on levee and canal construction; in 1907, resident engineer in charge of railway construction in Mississippi, and chief-of-party on survey of islands in Mississippi River; in 1908, in charge of highway bridge construction in Mississippi; in 1909, in charge of survey of timber land in Louisiana; from 1909 to date, with U. S. Engr. Dept., Newport, R. I.; since 1913 has held position of junior engineer; holds license to practice as civil engineer in Louisiana. Refers to A. S. Ackerman, J. R. Burke, T. G. Hazard, Jr., S. A. Miller, A. J. Ober and M. T. Whiting.

Richmond, Carl Gee, Revere, Mass. (Age 26, b. Peabody, Mass.) Graduate of Mass. Inst. of Technology, 1911. From June, 1910, to Jan., 1915, with Engineering Dept. of Mass. Highway Comm., on survey, office and construction work; from Jan., 1915, to date, city engineer and superintendent public works, Revere, Mass. Refers to C. F. Allen, A. W. Dean, E. R. Hyde, G. P. Soutar, C. M. Spofford, A. T. Sprague and C. S. Tinkham.

Robbins, Henry C., Newton Highlands, Mass. (Age 38, b. Westbrook, Me.) Special student of architecture, Harvard Univ., 1897–98. Was for seven years chief draftsman with Warren, Smith & Biscoe; was for two years architect with American Tel. & Tel. Co.; was for seven and a half years architect with Densmore & LeClear; since July, 1914, member of firm of Densmore & LeClear. Refers to G. H. Brazer, C. R. Gow, L. L. Street and L. C. Wason.

Rooks, Clarence Henry, Lawrence, Mass. (Age 51, b. Clifton, Me.) Educated in public schools, Clifton and Amherst, Me. From 1887 to 1888, with Mass. State Board of Health at Lawrence Experimental Station; from 1888 to date, with Essex Co. nearly continuously, as assistant engineer on hydraulic matters; in 1902 was with John R. Freeman on Charles River Dam investigation. Refers to J. R. Baldwin, F. H. Carter, R. A. Hale, C. T. Main, A. D. Marble, A. T. Safford and W. E. Spear.

Simmons, John Edgar, Wollaston, Mass. (Age 32, b. Wollaston, Mass. Graduate of Mechanic Arts High School, 1901; took postgraduate course, 1902; student at Mass. Inst. of Technology, 1902–05. From 1905 to 1906, foreman, Swift Soap Works, Somerville; from 1906 to 1912, superintendent, Flash Chemical Co., Boston; from March, 1912, to date, draftsman and estimator, Simpson Bros. Corp., Boston. Refers to H. B. Andrews, E. C. Hultman, D. P. Kelley, C. F. Knowlton and E. C. Sargent.

Webb, George Fuller, Bellows Falls, Vt. (Age 40, b. Bellows Falls, Vt.) Received common school education in public schools of Bellows Falls; since August, 1908, student with International Correspondence Schools, complete engineering course. From April, 1910, to December, 1912, with New Hampshire State Highway Dept.; during season of 1913, with Lane Construction Corp'n, Meriden, Conn., on highway construction; from 1913 to date, engaged in contract and engineering work, lately for B. A. Robinson, C.E., Bellows Falls. Refers to C. M. Brooks, A. W. Dean, H. B. Drowne and B. A. Robinson.

Whitmore, Harold Cushing, Lynn, Mass. (Age 28, b. Lynn, Mass.) Graduate of Dartmouth College, 1909, degree of B.S. From April, 1909, to July, 1910, rodman and instrumentman on Charles River Dam; from July to Dec., 1910, instrumentman with Mass. Harbor and Land Comm.; from Dec., 1910, to Aug., 1912, instrumentman and chief-of-party on Farnham

Dam, city of Pittsfield water supply; from Aug., 1912, to March, 1914, chief of-party on dam at Somerset, Vt., for Power Construction Co. of Shelburne Falls; office assistant with same company in main office at Shelburne Falls from March to Oct., 1914. Refers to W. N. Charles, T. F. Dorsey, J. N. Ferguson, J. L. Howard, H. A. Miller and C. F. Powers.

Whitney, Harry L., Somerville, Mass. (Age 52, b. Dublin, N. H.) Educated in public schools of Fitchburg, Mass. Has been connected with subway construction in Boston and Cambridge since 1906; in 1910, foreman on bridge and grade-crossing work for Coughlan & Shields; in 1911, foreman on finish construction, Section 2, Beacon Hill Tunnel; in 1912, foreman in charge of form work, Section A, Dorchester Tunnel; since Feb., 1913, superintendent at Cypher St. stock yards of Boston Transit Comm. Refers to H. C. DeLong, G. D. Emerson, L. B. Manley and P. B. Walker.

Williams, Frederick Crawford, Newport, R. I. (Age 25, b. Pawtucket, R. I.) Student at Brown Univ. from 1909 to 1913, civil engineering course. From June, 1907, to July, 1913, with City Engineer's Dept., Pawtucket, R. I., as field and office assistant, working summers and afternoons; from Nov., 1912, to Feb., 1913, worked evenings as draftsman with J. R. Freeman; from July, 1913, to date, transitman and draftsman with U. S. Engr. Dept., Newport, R. I. Refers to B. C. Bussey, G. A. Carpenter, A. J. Ober, E. S. Patton and F. A. Sweet.

LIST OF MEMBERS.

ADDITIONS.

Ackerson, Herbert N. . . . . 149 Independence Ave., Quincy, Mass.
Appleton, Arthur B. . . . . 15 Dane St., Beverly, Mass.
Barrett, Robert E. . . . . Framingham, Mass.
Brown, William A. 87 Homer St., East Boston, Mass.
Buckley, William J. . . . . 26 Lyman St., Lynn, Mass.
Cherry, Martin C. 22 Seymour St., Roslindale, Mass.
Cochran, William J. . . . . 117 Hancock St., Dorchester, Mass.
Cowles, M. Warren . . . . 137 Newbury St., Boston, Mass.
Dolliver, Henry F. . . . . 12 Pearl St., Lawrence, Mass.
Duffy, J. Henry . . . . 42 Cogswell Ave., Cambridge, Mass.
Eisnor, John J. . . . . 42 West Newton St., Boston, Mass.
Fuller, Philip E. . . . . Thorndike, Mass.
Griffin, John H. . . . . Gloucester, Mass.
Hall, Charles Loring . . . . 533 West Park St., Dorchester, Mass.
Hammond, N. LeRoy . . . . 30 Walker St., Newtonville, Mass.
Harris, Gilbert M. . . . . 201 Newtonville Ave., Newton, Mass.
Hunter, Harry G. . . . . Walpole, Mass.
King, Arthur C. . . . . 71 Colton St., Springfield, Mass.
Kirkpatrick, Charles D. . . . . 60 Federal St., Boston, Mass.

Lampie, Abraham L. .... 41 Lindsay St., Dorchester, Mass.
Miller, Charles A. .... 11 Wayland St., Wollaston, Mass.
Perley, Lew K. .... Laconia, N. H.
Perry, Chauncy R. .... Worcester Lane, Waltham, Mass.
Proctor, Fred W. .... North Adams, Mass.
Raymond, John W., Jr. .... 101 Balch St., Beverly, Mass.
Smulski, Edward .... 141 Milk St., Boston, Mass.
Stuart, George E. .... 122 Cabot Park, Newton, Mass.
Stucklen, Carl L. .... 26 Esmond St., Dorchester, Mass.
Sumner, Merton R. .... 135 Dutcher St., Hopedale, Mass.

CHANGES OF ADDRESS.

Babcock, Paul A. .... 493 Commercial St., Portland, Me.
Berry, Charles R. .... 81 Huntington Ave., Roslindale, Mass.
Bessey, Roy F. .... Care of U. S. Reclamation Service, Provo, Utah
Dotten, William J. .... 847 Fellsway, Medford, Mass.
Ellis, William H., Jr. .... 479 Meridian St., East Boston, Mass.
Hammond, Wilberforce B. .... 60 Fenway, Boston, Mass.
Hunter, William B. .... 116 Saratoga Ave., Yonkers, N. Y.
Hurd, Stephen P. .... 1900 Euclid Ave., Room 601, Cleveland, Ohio
McConnell, Ira W. .... Care of John Ware, Downey, Ida.
Milne, A. P. .... 689 Northrup St., Portland, Ore.
Monoghan, James F. .... 79 Milk St., Boston, Mass.
Sabin, Fred D. .... 14 Haskell St., Cambridge, Mass.
Simons, George W., Jr. .... 59 Astor St., Suite 15, Boston, Mass.
Smith, Sidney .... 84 Hastings St., West Roxbury, Mass.
Tinkham, Charles S. .... 24 Pond St., Greenfield, Mass.
Wilson, Albert O. .... 137 Winsor Ave., Watertown, Mass.

DEATH.

Rich, Isaac .... Died March 11, 1915

RESIGNATIONS.

(In effect March 17, 1915.)

Cunningham, J. Earl
Davis, Charles H.
Eaton, J. Haworth
Farwell, Howard L.
Harrison, Howard G.
Heald, Simpson C.
Heath, Arnold W.
Knowlton, Edgar
Manahan, Elmer G.
Murray, Frederic L.
Olmsted, Herbert W.
Peters, Anthony W.
Polleys, William V.
Saville, Charles
Shailer, Robert A.
Stetson, Charles E. F.
Walworth, Arthur C.
Willard, Ernest C.
Yates, Sheldon S.

EMPLOYMENT BUREAU.

THE Board of Government maintains an employment bureau for the Society, to be a medium for securing positions for its members and applicants for membership, and also for furnishing employees to members and others desiring men capable of filling responsible positions.

At the Society room two lists are kept on file, one of *positions available* and the other of *men available*, giving in each case detailed information in relation thereto.

MEN AVAILABLE.

297. Age 29. Student for one year at Dartmouth College. Has had more than ten years' experience, including three years as rodman and transitman with Met. Park Comm.; more than six years engineering work in Cuba, chiefly as assistant or resident engineer on railroad and street railway construction and maintenance; six months drafting on municipal work and nine months as assistant engineer in charge of construction and enlargement of water works. Desires position as engineer on survey or construction work.

298. Age 26. Graduate of Tufts College, 1911, with degree of B.S. in structural engineering. Has had more than a year's experience in detailing and designing of structural steel and three years' experience as structural engineer with Electric Illuminating Co. Desires position with engineer or contractor, in or near Boston, as designer or detailer on steel, reinforced concrete or masonry.

299. Age 25. Graduate of Mechanic Arts High School; student for one year at Harvard University and for three years at Franklin Union; has also taken I. C. S. course in municipal engineering. Has had about five years' experience, chiefly as rodman, draftsman and inspector on railroad and street railway work and on subway construction.

300. Age 23. Graduate of Mechanic Arts High School, 1910; is now student in structural course at Lowell Inst. Has had more than three years' experience as draftsman, including one and one-half years' with the Edison Electric Illuminating Co.; eight months with General Electric Co. of Lynn; seven months with Swift & Co., in construction department. Desires position as draftsman or on outside work.

301. Age 34. Graduate of Mechanic Arts High School, 1900. Has had about fifteen years' experience, including four years on landscape engineering; six years as civil engineer and draftsman, chiefly on railroad work, and about five years as mechanical draftsman and engineer for electric and hydraulic companies. Desires position as civil or mechanical engineer. Salary desired, $20 per week.

302. Age 62. Has worked continuously with Boston firm on esti-

mating and designing of structural and ornamental iron work. Desires position as structural engineer.

303. Age 29. Graduate of University of Maine, 1911, with degree of B.S. in civil engineering. Has had experience as rodman, inspector, transitman, etc., on electric railway construction and on reinforced concrete construction work; assistant engineer for industrial plant and designer and draftsman on mechanical engineering work Desires position as assistant engineer in field or assistant to designer in office. Salary desired, $125 per month.

304. Age 27. Graduate of Valparaiso University, Indiana, with degree of B.C.E. Has had one year's experience as transitman with B. & M. R. R.; three and one-half years' experience as assistant engineer for the estates of Long Beach, N. Y.; latter work included inspecting, surveying, and computing for hydraulic dredging, brick and macadam streets, water and gas mains, sewer mains and disposal plant, etc. Desires position as assistant or transitman. Salary desired, $100 per month.

LIBRARY NOTES.

Recent Additions to the Library.

U. S. Government Reports.

Annual Report of Chief of Weather Bureau for 1913–14.

Arguments for and against Train-Crew Legislation.

Eastern Hemlock. E. H. Frothingham.

Elliston Phosphate Field, Montana. R. W. Stone and C. A. Bonine.

Forest Planting in Eastern United States. C. R. Tillotson.

Hand Firing Soft Coal under Power-Plant Boilers. Henry Kreisinger.

Salines in Owens, Searles and Panamint Basins, Southeastern California. Hoyt S. Gale.

Water-Supply Paper 330.

State Reports.

Connecticut. Report of State Board of Health on Investigation of Pollution of Streams, 1914; House Bill No. 306, Act concerning Pollution of Water Supplies; House Bill No. 308, Act concerning Disposal of Sewage in Inland and Tidal Waters.

New Jersey. Mineral Industry for 1913. M. W. Twitchell.

Municipal Reports.

Belmont, Mass. Annual Report of Water Commissioners for 1914.

Brookline, Mass. Annual Report of Water Board for 1914.

Chicago, Ill. Report on Official Duty Test of Booster Pumps at Roseland Pumping Station.

Concord, Mass. Annual Report of Board of Health for 1914.

Concord, Mass. Annual Report of Road Commissioners for 1914.

Concord, Mass. Annual Report of Water and Sewer Commissioners for 1914.

Fitchburg, Mass. Annual Report of City Engineer for 1914.

Hartford, Conn. Annual Report of Water Commissioners for 1913–14.

Laconia, N. H. Annual Reports of Board of Public Works for 1914.

Leominster, Mass. Annual Report of Water Board for 1914.

New Bedford, Mass. Annual Report of Water Board for 1914.

North Adams, Mass. Annual Reports of City Officers for 1914.

Peabody, Mass. Annual Report of Commission of Public Works for 1914.

Plymouth, Mass. Annual Report of Water Commissioners for 1914.

Reading, Mass. Annual Report of Water Commissioners for 1914.

Rutland, Vt. Annual Report of City Officers for 1914.

Springfield, Mass. Annual Report of Water Commissioners for 1914.

Watertown, Mass. Annual Report of Town Officers for 1914.

Westfield, Mass. Annual Report of Municipal Light Board for 1914.

Miscellaneous.

C. L. Berger & Sons: Standard Instruments of Precision, 1915.

Carbolineum Wood Preserving Co.: Bulletins 33 and 36.

Construction of Masonry Dams. Chester W. Smith.

Designing and Detailing of Simple Steel Structures. Clyde T. Morris.

Dry Rot in Factory Timbers. Associated Factory Mutual Fire Insurance Companies.

Earth Work and Its Cost. Halbert P. Gillette.

Freight Terminals and Trains. John A. Droege.

Kearney & Trecker Co.: Milwaukee Milling Machines: Catalogue No. 19.

Modern British Permanent Way. Cecil J. Allen. Gift of Leslie H. Allen.

Preservation of Structural Timber. Howard F. Weiss.

Price of Inefficiency. Frank Koester.

Reinforced Concrete. John P. Brooks.

Reinforced Concrete Construction, 2 vols. George A. Hool.

Water Supply of Country Houses. William Paul Gerhard. Gift of author.

LIBRARY COMMITTEE.

NEW ENGINEERING WORK.

(Under this head a brief description of new engineering work contemplated or under construction will be presented each month. Engineers and contractors are requested to send descriptions of their work to the Secretary, 715 Tremont Temple, Boston, before 1st of each month.)

Commonwealth of Massachusetts. — METROPOLITAN WATER AND SEWERAGE BOARD. — *Sewerage Works.* — Surveys for the extension of the Metropolitan sewer to Wellesley have been started.

METROPOLITAN PARK COMMISSION. — *Furnace Brook Parkway.* — Bids have been received for building Furnace Brook Parkway from Quincy Shore Reservation to Hancock St., Quincy.

This work calls for about 40 000 cu. yds. of earth grading and furnishing of about 100 000 cu. yds. of filling. The lowest bidder is John Cashman & Sons Company.

Middlesex Fells Parkway. — Work of rebuilding the northerly half of Wellington Bridge, with reinforced concrete girder construction, is in progress. Coleman Brothers, contractors.

Mystic Valley Parkway. — Work of constructing parkway from Craddock Bridge to Mystic Ave. is in progress. Coleman Brothers, contractors.

General. — Considerable work is in progress throughout the reservations and parkways, undertaken with a view to relieving the conditions of unemployment.

DIRECTORS OF THE PORT OF BOSTON. — *Bulkheads.* — The wooden bulkheads adjoining the site of the proposed dry dock at the South Boston Flats are practically completed, making a total length of 10 305 lin. ft., of which 7 277.4 lin. ft. is composed of oak piles and sheeting 4 in. thick, and the remainder is of yellow pine piles with sheeting 6 in. thick.

Dredging. — The dredging of the Reserved Channel at South Boston east of the temporary entrance by the suction dredge *Tampa* has continued, making 30 ft. at mean low water in a channel 300 ft. wide. The dredging of the Reserved Channel in South Boston between L St. bridge and the temporary entrance is being done by J. P. O'Riorden's dredge No. 8 and is about 75 per cent. completed. Dredging is in progress at the site of Commonwealth Pier 1, East Boston, by the Bay State Dredging Company, making 40 ft. at mean low water.

Boston Transit Commission. — *Dorchester Tunnel.* — The Dorchester Tunnel is substantially completed from Tremont St. to the westerly side of Dewey Sq., including the Washington station.

Section D includes a station under Dewey Sq. and about 450 ft. of tunnel under Summer St. east of the station. Work is now in progress on both station and tunnel. The Hugh Nawn Contracting Co. is the contractor.

Section E includes two single-track circular tunnels which will extend from near the junction of Summer St. and Dorchester

Ave. under the Fort Point Channel and private property to a point near Dorchester Ave. between West First and West Second Sts., South Boston. These tunnels will be driven by means of shields and with compressed air. Work is in progress at the main shaft in West First St. and on the power plant. P. McGovern & Co. is the contractor.

Section H is located in Dorchester Ave. between Old Colony Ave. and Woodward St., and is about 2 200 ft. long. The structure is to be mainly of reinforced concrete, and consists of a double-track tunnel to be built by the cut-and-cover method. The work also includes a pump well, an emergency exit, and sewer changes. The T. A. Gillespie Co. is the contractor.

Enlargement of Park Street Station. — A brief description of the work for the enlargement of Park St. station was given in the December issue of the JOURNAL. The work of enlarging the station proper is now completed except the interior finish of the roof of the enlargement. The surface of the Common is being restored and the granolithic walks are being rebuilt.

Work is now in progress at the junction of Park and Tremont Sts. on removing the triangular core of earth and a part of the walls and roof and removing some of the columns of the present structure at that place and substituting new construction. Coleman Bros. are the contractors.

East Boston Tunnel Extension. — The tunnel extension has been completed with the exception of the interior finish of the two stations located under and near the present Scollay Sq. station and under Bowdoin Sq. respectively, and also with the exception of their stairways, entrances and exits. Work on the interior finish and on the stairways is in progress. In Court St. near the Ames Bldg. the invert of the East Boston Tunnel is being removed and the earth underneath excavated to the new grade.

City of Boston. — PUBLIC WORKS DEPARTMENT, HIGHWAY DIVISION, PAVING SERVICE. — Work is in progress on the following streets:

Bourneside St.,	Park St. to Melville Ave.	Bituminous macadam.
Westmoreland St.,	Adams St., about 708 ft. westerly.	Bituminous macadam.
Paisley Park,	Bourneside St. to Upland Ave.	Bituminous macadam.

Spring St.,	Gardner St. to Webster St.	Bituminous macadam.
Seaver St.,	Humboldt Ave. to Blue Hill Ave.	Excavating and grading.
Seaver St.,	Walnut Ave. to Humboldt Ave.	Excavating and grading.
St. Andrew Rd.,	Bayswater St. to Washburn Ave.	Bituminous macadam.
Intervale St.,	Columbia Rd. to Normandy St.	Bituminous macadam.
Fabyan St.,	Blue Hill Ave. to Harvard St.	Asphalt pavement.
Deering Rd.,	Blue Hill Ave. to Harvard St.	Bituminous macadam.
Temple St.,	Spring St. to Ivory St.	Excavating and grading.
Philbrick St.,	Neponset Ave. to Jewett St.	Bituminous macadam.
Ronald St.,	Brinsley St., about 263 ft. easterly.	Bituminous macadam.
Herbert St.,	Park St. to West Tremlett St.	Bituminous macadam.

Public Works Department, Sewer and Water Division, Sewer Service. — The following work is in progress:

Kilby St., city proper, Central to Milk sts.; rebuilding old wooden sewer.

Union Park St. Sewage Pumping Station, South End; machinery being installed.

Orleans St. at Marion St., East Boston. Tunneling under B. & A. R. R. freight tracks for 24-in. cast-iron pipe sewer.

At Beach St. outlet near Sullivan Sq., Charlestown; cofferdam for 5 ft. 3 in. circular concrete outlet sewer.

Dorchester Brook sewer rebuilding now near Judson St., Dorchester; large concrete surface drain and 15-in. pipe sanitary sewer.

Davenport Brook conduit, 11 ft. 0 in. x 5 ft. 6 in. concrete. Now at Adams St., near Minot St.; underpinning old culvert and buildings.

The Fore River Shipbuilding Co., Quincy, Mass., has the following work in progress:

U. S. Battleship *Nevada*.

Nineteen U. S. submarine boats.

U. S. Torpedo Boat Destroyers *Cushing*, *Tucker* and Nos. *63* and *64*.

Two oil-tank steamers.

Vol. II APRIL, 1915 No. 4

BOSTON SOCIETY OF CIVIL ENGINEERS
FOUNDED 1848

PAPERS AND DISCUSSIONS

This Society is not responsible for any statement made or opinion expressed in its publications.

THE ELIMINATION OF GRADE CROSSINGS.

BY L. BAYLES REILLY, MEMBER BOSTON SOCIETY OF CIVIL ENGINEERS.

THIS paper, which is the result of the writer's brief experience in grade-crossing abolition projects, is given in the hope that it may be of assistance to some of you who may be called upon to investigate or report upon such projects.

The subject is treated under the following headings:

I. Apportionment of Cost.
II. Manner of Obtaining Elimination.
III. Construction.

I. APPORTIONMENT.

Public safety and convenience require, and public sentiment is demanding, the abolition of grade crossings. Legislatures all over the country are passing laws relative to this matter, and already nearly half of the states have laws touching on the separation of grades.

Two very important provisions of these laws are, first, the fixing of the manner of determining the necessity for proposed work, and, second, the apportionment of the cost. The state of Massachusetts seems to have adopted an equitable and feasible method for determining the necessity of abolition, which will be

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NOTE. This paper will not be presented at a meeting of the Society, but discussion is invited, to be received by Edward C. Sherman, Editor, 6 Beacon Street, Boston, before August 15, 1915, for publication in a subsequent number of the JOURNAL.

described. As far as the apportionment of the cost is concerned, we do not seem to have been quite so successful, since there are arbitrary limits set which may not be equitable when the maximum amount is assessed upon any party, and since commissions have a tendency to assess upon the parties to the work the maximum percentages set by law, irrespective of the actual merits of each individual case.

One has but to note the difference between a crossing on a main state highway in an unpopulated district and a crossing in the heart of the business section of a city like Lynn or Lowell to appreciate that flexibility in the apportionment of cost is desirable. This flexibility is lacking in Massachusetts and in some other states.

In 1912 and 1913 the Massachusetts Railroad Commission and the Massachusetts Highway Commission investigated this subject very thoroughly. In a report to the legislature, an abstract of the laws of each state having any laws on the subject was made, with a review on the advisability of changing the present basis of the apportionment of cost. It was recommended "that the law be amended so as to provide expressly that the amounts assessed upon the cities and towns shall be proportionate to the benefits received, and to the ability of these municipalities to pay; and that the Railroad Commission shall be given the right before the final decree is entered by the court to review the apportionment of the cost as well as the general plan of grade separation made by the special grade crossing commission." No action was taken upon this report by the legislature in the session of 1913, it being postponed to this year's session.

The following is an abstract from the "Report on an Investigation of the Gradual Abolition of Grade Crossings," January 31, 1889, by A. W. Locke, William C. Webber and G. A. Kimball, commissioners, relative to this matter of apportionment:

> "Finally, we think that the expense of abolishing crossings should be generally divided between the railroad and the city or town, bringing in the county in special cases, and also the street railways and the adjoining estates, if they are benefited.
>
> "But we do not consider it practicable for the legislature to fix in advance the proportion to be paid by parties interested, for the reason that in no

two places that have so far come under our observation have the benefits or the disadvantages been equally divided. We would recommend that each one be divided on its own merits by some tribunal such as we have hereinbefore suggested."

Hence it is seen that the two commissions which have investigated this subject thoroughly have recommended an apportionment based upon " merit " and " special benefit."

From the abstract of laws compiled by the Railroad Commission it is seen that in Arizona, California, Michigan, North Carolina and Wisconsin full power is delegated to the commission to apportion the cost according to the equities in each particular case, *recognizing* the principle of " Special Benefit."

In Connecticut, Massachusetts, New Hampshire, New Jersey, New York, Ohio, Vermont and Washington the legislatures deny the commissions this privilege, and fix definite limits to the proportions to be paid by the various parties. These limits are arbitrary and cannot be changed even though the conditions of a particular case warrant a different apportionment.

In New Hampshire and New Jersey the entire cost is imposed upon the railroads under all conditions.

In Connecticut, New York and Washington the principle of priority in location is recognized.

In Connecticut the entire cost is paid by the railroad when the petition to separate grades is made by the railroad. In case the petition is made by the municipality, it may be charged 25 per cent. at highways in existence before the railroad was built, and 50 per cent. at crossings built across a railroad location.

In New York, when a new railroad is constructed across an existing highway above or below grade, the entire expense is borne by the railroad; whenever a new street is constructed across an existing railroad, the railroad company and the municipality divide the expense equally; and whenever a change is made in an existing crossing, the railroad pays 50 per cent., the municipality 25 per cent. and the state 25 per cent.

In Washington the railroad pays the entire cost when it crosses over or under an existing highway, and in all other cases it bears a portion of the cost, depending upon the equities of the case.

In Massachusetts the railroad pays 65 per cent. of the cost on the assumption that it receives the most benefit from the abolition. The street railway, when there is one, pays a maximum of 15 per cent.; and the remainder of the cost is apportioned between the commonwealth and the city or town, but not more than 10 per cent. of the total cost may be apportioned on the city or town.

The cost has usually been apportioned as follows: Railroad, 65 per cent.; commonwealth, 25 per cent.; and the city, 10 per cent. Where a street railway is involved, the steam road usually pays 65 per cent., the street railway 15 per cent., the commonwealth 10 per cent., and the town 10 per cent., although in the last two apportionments of note, at Quincy (estimated cost, $250 000) and at Taunton (estimated cost, $2 800 000), the street railway was assessed 12 per cent.

The following are statistics obtained from the Railroad Commission's Report of 1913 to the legislature, and from Mr. H. W. Hayes, engineer of the Public Service Commission:

COST OF THE ELIMINATION OF GRADE CROSSINGS, ACTS OF 1890, TO NOVEMBER 30, 1907.

	Number.	Average Cost.	Total Cost.
Crossings in Boston........	34	$340 000	$11 559 352
Crossings outside of Boston..	303	58 164	17 623 839
Total....................	337	86 597	29 183 191

From the report of the Commission of 1888, information from various sources made it apparent that there were at that time 2 267 highways crossing railroads at grade. Returns made to the Board of Railroad Commissioners as of June 30, 1912, showed that there remained in the commonwealth 1 784 crossings at grade, making a total of 483 crossings abolished from 1889 to 1912.

The total amount expended on the elimination of grade crossings to January, 1913, is $39 144 286, or an average of $81 000 per crossing. I have it upon competent authority that the average yearly maintenance of crossings is $1 200 per year, including wages of crossing tenders, maintenance of crossing gates, planking, etc. Capitalizing this at 5 per cent. indicates that the railroads could afford to pay $24 000 per crossing, or 33.7 per cent. of the average cost of $81 000, without considering the benefits to be received from increased speed, facility of operation and the elimination of accident claims.

This is apparently the only determinant factor in the whole problem of apportionment; the others must be approximated from traffic counts and other data obtainable in individual cases. It is quite generally conceded that municipalities receive more than a 10 per cent. benefit from abolitions, but that this low figure was arrived at to encourage petitions for eliminations. There can be no question as to the success of this idea, as there are now pending proceedings for about one hundred grade-crossing abolitions.

II. MANNER OF OBTAINING ABOLITION OF GRADE CROSSINGS.

When a town, city, railroad or street railway wants a grade crossing abolished in Massachusetts, a petition is submitted to the Superior Court, which thereupon appoints a special commission of three members. This special commission, after holding a hearing, decides upon a plan, apportions the cost, specifies what part of an existing public or private way shall be discontinued, the grade for the railroad, the way the changes are to be made in the location and grades of the street railway, the general method of construction and what land and other property it considers necessary to be taken. It also prescribes the manner and limits of the work and determines which of the interested parties shall do the work. Land owners, railroad, commonwealth, city or town and street railway present their suggestions and criticisms of proposed plans, and in this way the best plan is evolved.

In some instances where there is a direct conflict of opinion as to the manner of abolition, the matter is carried to the state legislature, which passes an act on petition authorizing the abolition and specifying in detail the method to be adopted and the apportionment of the cost. An act of the legislature is necessary when work is contemplated in conjunction with grade-crossing work, which could not be actually considered as part of it, as when the railroad wishes for an extension and amplification of its facilities. An instance of this is found at Lynn, where the Boston & Maine Railroad is improving its tracking facilities by the abolition of grade crossings and by increasing the number of main line tracks from two to four.

There are two other methods of obtaining the abolition of crossings:

I. By the agreement of the interested parties, the Massachusetts Public Service Commission can be made the special commission with the same powers and duties as above described.

II. If the directors of the railroad and the selectmen of a town agree upon a plan for the abolition of a crossing, and if this agreement is approved by the Public Service Commission, the crossing may be abolished, provided the railroad and the town together pay 80 per cent. of the cost. The commonwealth pays the remaining 20 per cent. in such cases. Georgetown, Mass., furnished an instance of this procedure in 1913. For details of this method see Chapter 544, Acts of 1910.

III. CONSTRUCTION.

Actual cost is perhaps the most interesting thing to the parties involved, after the apportionment is decided upon. The following are a few unit prices the writer has found useful when estimating the cost of construction of such projects. They are based on labor at $2.00 a day and the prices of materials current in 1912, but do not cover all cases, since accessibility of the work, length of haul, traffic and other factors influence them very much and *each case* must be considered *independently*.

UNIT COSTS.

Earth embankment (under traffic)	$0.70 cu. yd.
Earth embankment (from trestle)	0.40 cu. yd.
Earth excavation	0.50 cu. yd.
Pile foundations, spruce 25 ft. 0 in. long	5.00 per pile.
Retaining wall (concrete)	7.00 cu. yd.
Abutments (concrete)	7.00 cu. yd.
Macadam roadway	0.80 to 1.25 sq. yd.

Granite block paving (new) gravel joints	$2.00 to 2.50 sq. yd.
Granite block paving (relaid)	0.70 sq. yd.
Brick sidewalk	1.10 sq. yd.
Granolithic walks	1.80 sq. yd.
Tar concrete walks	0.75 sq. yd.
Edgestones reset	0.25 lin. ft.
Edgestones new	1.00 lin. ft.
Surface drains	1.80 lin. ft.
Relaying water pipe	3.00 lin. ft.
Arch culvert masonry (small spans)	12.00 lin. ft.
Temporary platforms (plank)	1.20 sq. yd.
Iron fencing	1.50 lin. ft.
Wooden fencing	0.50 lin. ft.
Main railroad tracks	1.50 lin. ft.
Temporary railroad tracks	0.50 lin. ft.
Railroad trestle, temporary	10.00 to 15.00 lin. ft.
Bridge steel	0.045 per lb. in place.
Timbering, per M. ft. B. M., in place	60.00
Drains: 18 in.	1.50 lin. ft.
12 in.	1.00 lin. ft.
8 in.	0.80 lin. ft.
Taking up and relaying street railway track, without betterment	1.25 per ft.

The work is done by the railroad, and, as might be imagined, the actual cost is sometimes the subject of considerable discussion among the other parties. Charges are kept according to the specifications of the Interstate Commerce Commission, similar to ordinary railroad charges.

After the completion of the work the expense of maintenance and repairs is paid as follows:

SECTION I, CHAPTER 156, ACTS OF 1912, QUOTATION.

"After the completion of the work, the expense of maintenance and repair shall be paid as follows: If the public way crosses the railroad by an overhead bridge, the framework and flooring of the bridge and its abutments shall be maintained and kept in repair by the railroad corporation, but the approaches of the bridge, and, if said flooring has a wearing surface, consisting of an upper planking, paving or other surface material, such wearing surface of the bridge shall be maintained and kept in repair by the city or town in which they are situated; if the public way passes under the railroad, the bridge and its abutments shall be maintained and kept in repair by the railroad corporation, and the public way and its approaches shall be maintained and kept in repair by the city or town in which they are situated; if the several railroads cross the public way at or near a given point, the commission shall apportion and award in what manner and proportion each of said railroad corporations shall maintain and keep in repair the framework of the bridge and its abutments, if the public way crosses the railroad by an overhead bridge, and the bridge and its abutments, if the public way passes under said railroads."

The Superior Court appoints as auditor, a disinterested person, not an inhabitant of the city or town in which the crossing is situated, who audits all accounts of expense incurred by the railroad, street railway company, city or town and special commission. This auditing, when accepted by the court, is final.

It often happens that in connection with grade abolition projects, improvements in railroad or city facilities are made, such as street widening, increasing the number of railroad tracks, or increase in freight handling accommodations. Such things as these are to be paid for by the one who receives the benefit of the betterment. A sharp distinction is sometimes impossible as to just what is betterment and what is necessitated by the abolition of grade crossing.

The following is given as an instance of how some of the main features of a plan are adopted. The railroad, since it pays the greatest portion of the cost, asks, as a rule, for a 5 per cent. or 6 per cent. street gradient. For traffic reasons the city usually objects to anything over 3 per cent. The result in many cases is a compromise, streets on main thoroughfares being built with not over 3 per cent. grades, other streets not on main thoroughfares with as high as 7 per cent. grades. In one case, in Fall River, 12 per cent. was allowed on account of the fact that this gradient existed on adjacent streets.

The question of land damage enters into this question of street grades, and the two should be considered together. As a general rule, when land damage is high, street grades are heavy, and when land damage is low, street grades are low.

The question as to whether the street is to cross over the railroad or vice-versa is determined by considerations of economy. Where several crossings are to be eliminated which are fairly close together, the railroad can be raised above the streets or depressed below them. As stated before, it is not usually economical to depress the railroad. The important elements which determine track elevation, or street elevation or depression, are accessibility of dump for excavated material, the number and length of bridges crossing the railroad, the length of haul to borrow pit, drainage of railroad if depressed, the drainage of streets if depressed, and the architectural question of civic beauty. In the case of the elimination of a single crossing, railroad elevation or depression is not economical since the railroad grades are usually limited to .57 per cent., while street grades vary from 2 per cent. to 7 per cent. The result is the elevation or depression of the street. This applies not only to a single isolated crossing, but also to the case where several crossings are so far apart that the cost of railroad elevation or depression is high.

Each particular problem must be studied carefully before any plan is adopted. Estimates of cost should be made, if necessary, to determine which of the following methods should be used: First, railroad elevation; second, railroad depression; third, street elevation; fourth, street depression; or a combination of railroad elevation with street depression or vice-versa. It must always be borne in mind that, if railroad depression is adopted, the track must be lowered about 21 ft., 18 ft. for clearance and 3 for bridge floors, while if track elevation is used, there is a change in grade to be made of about 17 ft., 14 for clearance and 3 for bridge floors. Except in the case of sidetracks, which may be made 16 ft., these clearances are required in Massachusetts, unless authorized otherwise by the Public Service Commission.

In Canada the Railway Act provides that every bridge over a railway shall have a clearance of at least 7 ft. above the top of the highest freight car, such clearance never to be less than 22 ft. 6 in. above the base of rail, except with the approval of the board. An appeal was made from this in 1911 for a clearance of 19 ft. by the roads entering Toronto. The commission ordered the standard clearance of 22 ft. 6 in. to be provided.

Some of the other factors to be observed in the design or the comparison of proposals for the elimination of grade crossings follow:

Land damage on an abolition project is complicated and is left for the legal fraternity and the real estate experts to settle.

The engineer's duty in this matter is to see that excessive damage is avoided by building retaining walls. Where land is cheap, take it; where it is expensive and damage can be avoided by the construction of a retaining wall, investigation and estimates must be made to determine the comparative cost. Common practice has established the following rule in estimating the cost of land damage:

Where a taking is made, the estimate is twice the assessed valuation of the land and buildings. Where there is damage due only to change of street grade, 60 per cent. of the assessed value is figured for the damage. This rule is an arbitrary one which usually works out on the safe side, but in many cases does not.

LAND DAMAGE SETTLEMENTS. PERCENTAGE OF ASSESSED VALUATIONS.

Town or City.	Years.	Number of Cases.	GRADE DAMAGE.		Per Cent.	LAND TAKINGS.		Per Cent.
			Assessed Val.	Settlement.		Ass'd Val.	Settlement.	
Somerville, Dane St....	1912	19	$46 500	$32 650	70	.....	.....	....
Somerville, Webster Ave........	1910	1	......	......	....	$5 500	$7 500	136
Somerville Webster Ave.......	1910 –12	43	202 500	89 635	44.3	.....	.....	....
Somerville, Medford Ave........	1912	1	2 500	1 400	56.1	.....	.....	....
Lynn................	1910 –12	37	179 550	53 419	29.7	.....	.....	....
Lynn................	1910 –12	4	......	......	....	31 400	46 800	149
Neponset............	1910 –12	5	14 789	17 500	118.5	....	.....	....
Neponset............	1910 –12	11	......	......	....	20 812	31 691	152.5
Total Gr. Dam., 44% of Ass'd Val.........		105	445 839	194 604	....	.....	.....	....
Total Gr. Takings, 145% of Ass'd Val...		16	......	......	....	57 712	85 991	....

The preceding table shows the percentage cost of grade damage to assessed value in 105 actual settlements to average 44 per cent., and the percentage cost of land takings in sixteen actual takings to be 145 per cent.

All Settlements Included.

At the Boston, Revere Beach & Lynn Railroad crossing, at Saratoga Street, East Boston, abolished in 1913, the damages paid amounted to 89 per cent. of the assessed value.

In the abolition of the East Boston grade crossings, seven in all, in 1906, the damages amounted to 32.43 per cent. of the assessed value, omitting two small payments to large estates, the Standard Oil Company and the National Dock & Warehouse Company.

In the abolition of the Dorchester Avenue grade crossing in Boston, 1900, the land damage was 71 per cent. of the assessed value.

From this it is seen that the use of the arbitrary figures of 60 per cent. for land damage and 200 per cent. for land takings must be accompanied with the exercise of some discretion. In using the value of 200 per cent. for land takings, it is customary, where large estates are under consideration, to use a depth of 100 ft. from the line of grade change.

Another method of arriving at a figure for land damage is to obtain an appraisal of the property as it stands from a disinterested expert, show that expert the amount of damage caused by the project, get another appraisal from him, subtract the two appraisals, add to the result 25 per cent., and this result will usually be much closer to the actual cost than the arbitrary allowance of 60 per cent. This method is based on the fact that an abutter is entitled to have his property left in the same condition and relative location, after the grades are changed, as it was before, or, if this is impossible, a sufficient sum of money to cover this change, with the market value of the property as the upper limit of such sum. The choice of methods should be governed by the exigencies of each case.

A feature that is very important is the proper provision for the maintenance of traffic during construction. This is done by temporary crossings over adjacent land, or, when this is not possible, other methods, such as the construction of one half the structure at a time, are adopted.

The discontinuance of public ways or the continuance of them involving real damage to property without redress at law should not be permitted unless circumstances absolutely compel such discontinuance. The proper drainage of streets should not be interfered with by the depression of them under the railroad, nor should the flow through trunk-line sewers be hindered. Street junctions should be carefully planned to avoid danger points, pockets and sharp grades.

The devotion of taxable property to new streets and ways should not be allowed unless the benefit received is greater than the loss incurred. This is a point which often causes a loss to cities and towns which cannot be retrieved.

Traffic routes should be made as direct as possible, since circuitous routes are apt to cause the introduction of danger points at street junctions and to inconvenience pedestrians greatly. Railroad stations should be easily accessible to traffic, vehicular, street railway and foot, in grades, elevations and layout. Station driveways and automobile and carriage yards should be built wide, and with an eye to increasing traffic volume.

Provision should be made for future industrial side tracks, as lack of foresight in this direction is apt to cause inconvenience and expense and actually hinder the future commercial development of the community.

Structures.

On main city thoroughfares, depressed under the railroad, solid, ballasted bridge floors are to be commended. They should be well waterproofed with pitch and tarred felt, to render them drip-proof. The depth of floor is fixed by grade and clearance requirements. Where more than three tracks pass over the street, the bridge should be divided into two parts, to prevent darkening of the street, although the railroads usually object to this, since it introduces curves in the track. The usual construction over streets consists of through steel plate-girder spans. Where streets and sidewalks are wide enough, the cost of these structures may be reduced materially by providing supporting bents on the curb lines or at the center of the street, although many cities prohibit the use of these bents for traffic reasons. In outlying sections open floor bridges are used to a large extent. It must always be remembered, however, that these grade-crossing abolitions are permanent, and the structures provided should be made as permanent as circumstances warrant. The use of concrete slab floors with ballast well waterproofed is likely to be the most economical in the long run, since maintenance charges are reduced, constant inspection is not necessary, and nuisances from noise and water-dripping obviated.

Highway bridges over railroads should be designed to accommodate the loads passing over them, and when carrying street railways, should be designed according to the "Specifications of the Massachusetts Railroad Commission for bridges carrying street railways, 1908." In general, the practice obtaining in the cities or towns in which they are located should be followed.

Apportionment of Work.

It is customary in Massachusetts for the special commissions to apportion the work to be done. They usually prescribe that the work is to be done by the railroads, other public service companies doing the work involving changes in their respective lines. It is seldom provided that municipalities do the work involved in the street changes, such as paving, street surfacing and edge-stone setting. This frequently leads to trouble, as the railroads naturally want the work done as cheaply as possible, and sometimes succeed in accomplishing a cheap-looking job as a result. It would appear that, if the towns and municipalities were permitted to do such work as this, which they are probably equipped to do in better and more permanently economical fashion, one incipient cause of disagreement could be eliminated.

Betterment.

It is the duty of the engineers engaged in this work to see that no betterment is made in any work connected with grade abolition (see decision of Supreme Court of Massachusetts, Reports, Vol. 172, 1898–99, pp. 5–11 inclusive) unless the parties making any betterments pay for them themselves. In the making of plans, criticising of plans, and in the checking of the costs, the question of *Betterment* versus *Reasonable* and *Suitable Substitution* for existing facilities confronts the engineer. A broad and equitable attitude must be taken toward this question for the mutual benefit of all concerned.

The following is a recapitulation of the points to be observed in designing or criticising the design of a grade abolition project:

1. Cost.
2. Discontinuance of important public ways or continuance of same involving real damage to property without redress at law.
3. Drainage (railroad and highway).
4. Sewage flow (pipe changes, etc.).
5. Street junction, avoidance of danger points and pockets.
6. Minimum of taxable property to be devoted to new streets and ways.
7. Traffic routes — vehicular and street railway, distances, grades and maximum avoidance of curves.
8. Railroad grades should be slight at stations.
9. Highway grades.
10. Accessibility of stations to traffic — vehicular, street railway and foot.
    (*a*) In grades, elevations and layout.
    (*b*) Station driveways and carriage yards.
11. Industrial sidetracks.
12. Bridge headroom.
13. Minimum of land damage.
14. Maintenance of traffic during construction.
15. Bridges and other structures — strength, permanence, waterproofing.
16. Apportionment of work.
17. Betterments.

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BOSTON SOCIETY OF CIVIL ENGINEERS
FOUNDED 1848

PAPERS AND DISCUSSIONS

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ADDRESS AT THE ANNUAL MEETING, MARCH 17, 1915.

THE DUTIES AND SPHERE OF ACTION OF A LOCAL ENGINEERING SOCIETY WITH SPECIAL REFERENCE TO THE BOSTON SOCIETY OF CIVIL ENGINEERS.

By Harrison P. Eddy, President, Boston Society of Civil Engineers.

The past year has been an important one in the history of our Society, which is now completing its sixty-seventh year. The interest of our members in the affairs of the Society attests their appreciation of the opportunities it offers and the obligations it imposes. The first volume of the Journal of the Boston Society of Civil Engineers has been completed. It is a credit to the Society, to the contributors, and to the editor, to whom the Society is indebted for the skillful and painstaking work which has resulted in the publication of this very attractive volume.

A year ago our membership was 837. To-day the members and applications on file number 1 004, an addition of 167 in spite of general business depression and the fact that many engineers have been out of employment and many others have felt it wise to husband their resources much more scrupulously than usual. There must be a cause of fundamental importance behind such growth, for even in view of the efforts of the membership committee, which has worked hard and conscientiously, so great a growth in such an unfavorable year is remarkable.

The cause must be the belief that the Society can furnish what engineers want and need, and we may well pause at this time and ask ourselves what has the future in store for us and what are our obligations.

The Constitution states:

> "The objects of this Society are: the professional improvement of its members, the encouragement of social intercourse among engineers and men of practical science, and the advancement of engineering." (Art. I.)

It is important to keep these objects clearly in mind, but a study of the foregoing quotation leads to the conclusion that while the objects are specific they are of such a nature that there may be wide latitude in the selection of the activities of the Society. A comparison with the objects of the American Society of Civil Engineers* shows that the objects of the two societies are similar, although that of the national organization lays emphasis upon the "maintenance of a high professional standard" while that of the local society makes prominent "the encouragement of social intercourse among engineers and men of practical science. . . ." So far as the wording of the respective constitutions is concerned, the difference is slight, but as a matter of practical application it is an important one.

ENCOURAGEMENT OF SOCIAL INTERCOURSE.

The membership of the national society (about 7 500) is not only very large but is widely scattered throughout the country, and in fact throughout the countries of the world. It is not possible for the general membership to engage in social intercourse. The average member cannot expect to have the benefit of personal acquaintance with more than a small fraction of the members; if located in one of the larger American cities this number will probably not exceed 100 or 200, and if located in a small municipality at considerable distance from a large city, he is fortunate indeed if he has an acquaintance with more than fifty members, — say 2 per cent. and 0.7 per cent. of the members, respectively.

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* "Its object shall be the advancement of engineering knowledge and practice and the maintenance of a high professional standard among its members." (Constitution, A. S. C. E., Art. I, Sect. 3.)

The Constitution of the A. S. C. E., Art. I, Sect. 4, stipulates that "among the means to be employed for this purpose shall be: meetings for the presentation and discussion of appropriate papers and for social and professional intercourse; the publication of such papers and discussions as may be deemed expedient; the maintenance of a library, the collection of maps, drawings and models, and the establishment of facilities for their use." (Constitution, A. S. C. E., Art. I, Sect. 4.)

In a local society, on the other hand, there is a much greater opportunity for social intercourse. But in spite of this fact, the average member of the Boston Society of Civil Engineers probably is acquainted with less than one hundred members, and there are few whose acquaintances include as many as 250, — 10 and 25 per cent. of the members respectively. Does not this indicate a serious failure to fulfill properly one of the objects of the Society?

Several functions have been held in recent years to develop the social life of our Society, among which may be mentioned the annual dinner and smoker, the dinners of the Sanitary Section, the dinner of the joint engineering societies, students' night, ladies' night, and, finally, the dinners of the past year preceding some of the regular meetings. Notwithstanding these opportunities for social intercourse there is still something lacking. Every resident member should know at least a majority of the resident members, and he should know them well enough to enable him when meeting them to select topics of conversation which will be of mutual interest and benefit.

The Board of Government, through appropriate committees, may well encourage social intercourse with particular reference to providing opportunities for the members to increase their acquaintance. But it is not wholly a responsibility of the Board of Government and its committees. Every member should accept his share of the obligations, and if each will exert himself a little the result will be of great benefit to the Society. We admit new members, but do we afford them proper opportunities to become acquainted with their new associates?

I have taken up the social department first because I believe it to be of fundamental importance to the full development of the other objects of a local society. A national society must of necessity confine its activities primarily to the publication of papers, researches by its committees and the development of its library, — all educational functions. This is an unbounded field of usefulness which has tended toward the "advancement of engineering knowledge and practice and the maintenance of a high professional standard among" the members of the national society. But a local society must do more; it must have a personal interest in and oversight of its members. It should be a sort of fraternal organization, seeking to assist its members in every way consistent with the ideals of the engineering profession and the fundamental principles of professional ethics.

Professional Improvement of Its Members.

The second object of the Boston Society of Civil Engineers is the professional improvement of its members. I class it as second, not because less important than the encouragement of social intercourse, for there are many ways in which it is more important, but because the best progress cannot be made in the professional improvement of the members of a local engineering society until after they have become acquainted, have acquired an interest in the work and activities of their associates, and have established an *esprit de corps* and acquired a loyalty to their society.

The activities of this Society are largely of an educational nature, such as meetings for the presentation and discussion of professional papers, the publication of such papers and discussions, and excursions for the inspection of engineering works.

There seems to be, however, an opportunity to greatly increase its usefulness in this respect. A society should strive to meet the needs of all of its members, and this can be done best by systematic organized effort. There should be papers for the members of each branch of engineering, such as the structural, railroad, bridge, and sanitary engineers. How to accomplish this is not easy to ascertain. There is, at times, much difficulty in securing papers regardless of subjects, and if a committee were confronted with the task of securing papers on specific, predetermined topics, its difficulties would be much increased, but not insurmountable.

Nevertheless, the advantage to be derived is worth the effort. At the beginning of a committee's work it should devote considerable time to a study of the needs of the society and lay out a program for the year's papers which will provide as far as possible for the requirements of all the members. As one of the important functions is to meet and become acquainted with the leaders of the profession, plans should be made to secure addresses from several such engineers each year. It is also the duty of the society to take a live interest in the engineering activities of the community, such as the building of state highways, measures for the protection of the public health, problems relating to the regulation of public service corporations and such more local enterprises as Metropolitan parks, sewers and water works. To this end engineers and officials competent to present these subjects should be given an opportunity to do so, and the members should enter into a thorough discussion of the topics so presented. Such discussions need not be mutual admiration meetings solely, — they should be characterized by an attempt to get at all the truth. All such questions are debatable, and that discussion which brings out different and sometimes opposing views is likely to be most helpful and interesting. Such discussions need not be acrimonious, feelings need not be injured, but a good lively discussion by broadminded engineers would add great interest to our meetings. It may be considered somewhat old-fashioned to suggest holding an occasional debate upon an engineering topic, but it might be an innovation which would prove decidedly interesting.

The society should encourage the presentation of papers by members, each of whom should feel that this is the forum for the discussion of those topics in which he is most interested. To stimulate interest, it may be well to provide one or more prizes or medals similar to that generously donated by our distinguished past president, Desmond FitzGerald. Such a course has been tentatively suggested to the Board of Government by a committee appointed to consider what the Society ought to do for our junior and student members. This committee has wisely recommended devoting more attention to such members, and affording them greater opportunity than they have enjoyed in the past. It is from such members that the strength of the Society in the future will be derived, and every practicable means of interesting and aiding them should be utilized.

Organization of Sections. — The program suggested, no doubt, seems to many to be formidable and perhaps impracticable. It certainly infers greater activity, more work on the part of officers, and better organization than we have had during the year now closing. But I maintain that it can be achieved without placing an undue burden upon any one. It must be done, however, through more perfect organization, which perhaps may be accomplished most readily by means of additional sections. Our Sanitary Section has been successful from its formation, eleven years ago. The annual average attendance at its meetings has varied from 21 to 88 per cent. of its membership, while that of the Society has varied from 10 to 21 per cent. Its discussions have been good, and there has been a spirit of sociability and good-fellowship which has sprung from general acquaintance and community of interest.

There is an opportunity for several more sections, — for example, a Railroad Section, a Structural Section, and perhaps a Municipal Section. Sections may be formed for temporary work without the intention of their continuing in existence more than a year or two. Certainly no section should be continued if its work is finished or if it neglects to prosecute its work actively. It may be argued that such sections would tend to split up the membership and detract from the interest in the parent Society. This does not seem a necessary or likely result, if reasonable care is exercised in the organization of the sections. It has not proved true of the Sanitary Section.

The sections should be organized to foster interest in special fields, and may act as committees of the Society upon such topics. They should, in fact, be regarded merely as committees. They may be allotted certain stated meetings for which they shall provide and be responsible. Such meetings would perhaps take the place of the special meetings for which there appears to be a demand. Thus organized, the parent Society would hold meetings, at which the tendency would be to present papers which would be attractive and of value to a large proportion of the members, and to provide addresses of wide interest and speakers of distinction.

Such an organization would increase the capacity of the Society. The work otherwise devolving upon a few officers and committees would be distributed among many. The interest taken in the affairs of the Society would be much increased, for the greater the number of members taking an active part in the proceedings, the greater will be the interest. The members will secure a greater return from their membership, — to put it in a homely way, they will get more for their money and effort.

The Library. — In spite of the effort which has been made to complete files of reports, improve the arrangement and provide a suitable index of our library, there are occasional rumors that it is not all that it should be. As this is one of our most important enterprises, serious consideration should be given to its needs. It is of the utmost importance to determine its proper scope. When considering this we should bear in mind the great wealth of libraries in and around Boston. It may be that the chief feature of this library should be its files of municipal, state, national, foreign and other engineering reports. Such files, to be of value, must be kept up to date, for many reports, while they may be had for the asking when published, cannot be procured a short time after they are issued. The expense of maintaining such files is nominal and they constitute a collection of great value. There should, of course, be a limited supply of journals of engineering societies, engineering periodicals, engineering works of reference, encyclopedias and the like, which will facilitate study at the library, but it is a question how wide a field we should cover and how far we should go. A decided advance would be made if a definite program could be adopted by the Society, and a list of the journals and files of reports ought to be printed either in the JOURNAL or as a part of the year book, that the members may know what journals and reports they may expect to find in the library.

Courses of Instruction. — There is a substantial difference between the requirements of our older and our younger members. The former, having had years of experience, through which they have attained much of the knowledge which they feel that they require for their regular business, are more inclined to give their time to the addresses of men who have achieved distinction and who can speak of the large problems from personal experience. The younger members, on the other hand, crave definite information and data which they can utilize directly in their work. They feel the need of instruction and are more willing than the older members to give their time to studying the smaller problems with which they come in contact. One way in which we could do more for the younger members would be to provide a few courses of instructive lectures. It might be necessary to compensate such lecturers, and it may be wise for the Society to make a nominal charge for attendance upon such courses, — enough to pay a part or perhaps even the whole of the expense involved. Courses should preferably be limited to four or five lectures and confined to the more common engineering problems.

The Advancement of Engineering.

The third constitutional object is "the advancement of engineering," by which I assume we mean the elevation of engineering as a profession, securing more general recognition of the professional ability of the engineer, and obtaining for him a more generous share of the credit for his work — and, coincident therewith, more nearly adequate compensation for his services. The deficiencies on the part of the public in these respects are undoubtedly largely due to its lack of knowledge, the causes for which have been discussed so often that we may pass over them now. There are, however, certain things which our Society has done for the enlightenment of our fellow-citizens, but a beginning only has been made. It would seem that the time is opportune for a more systematic and a greater effort. Among the efforts thus far made are coöperation of this Society with local organizations of mechanical and electrical engineers, the study of proposed legislation and attendance at committee hearings to advocate or oppose certain bills and the appointment of a representative to prepare for the daily papers reports of addresses and discussions given at the meetings of the Society.

Coöperation of Local Engineering Societies. — It has become the custom for our Society to coöperate with the mechanical and electrical engineers in holding annually a joint dinner and about three other joint meetings. In this way the members of each organization increase the circle of their acquaintance, come to have an interest in some of the problems attracting the attention of the others, and broaden their influence and that of their society.

Such coöperation has social and educational advantages, but of more importance would seem to be the opportunity for advancing the cause of engineering. At such meetings, which are likely to be largely attended, an effort will naturally be made to secure addresses of more general interest than many of those of perhaps a more highly technical nature presented at regular society meetings. A well-directed effort to secure the attendance at such meetings of those who may be interested in the subjects but who are not engineers will aid in placing the work of the engineer before the public in a proper light. Too little has been done in this direction at these meetings and also at regular meetings of our Society. This is a line of work which can be easily taken up and carried along if a little systematic effort can be devoted to it. The expense of printing a few additional notices and of postage will be insignificant, and it would seem that the results to be obtained may be of considerable importance. If such notices could be accompanied by personal letters from members of the societies to acquaintances, inviting them to be present, they would be still more effective.

Interest in Legislation. — It is the duty — too often neglected — of every citizen to take an active interest in matters receiving legislative consideration. Most such measures are of local interest, and therefore are more properly considered by a local than by a national engineering society.

The remark was made, during the past year, that the engineers seem to be almost the only body of men making a pretense at having representative organizations who do not have a committee or especially appointed members to ascertain and report to their society proposed legislation of direct interest to it. It certainly is an interesting and, I fear, a significant fact that this Society, numbering nearly one thousand members, has not ordinarily seriously considered pending legislation, not taken a part in the movements for or against bills which might have directly or indirectly an important effect upon the engineering profession or upon engineering problems. This year several members of the legislature are engineers, one of whom is a member of our Society. The Board of Government has assumed the responsibility for the appointment of a committee to consider proposed legislation, and take such action regarding it as is deemed necessary. The Board has also authorized and requested members of the Society to attend committee hearings on two occasions and oppose proposed bills which were deemed unwise, in the interest of the public, as well as in the interest of the engineering profession. A committee should be regularly appointed each year, preferably in such a manner that some of its members may hold office more than a single year, thus giving the committee a continuity of personnel which will make it more useful. In this connection I would suggest that the Society may well consider the advisability of simplifying the procedure required by the constitution for the endorsement of measures and provide for authoritative opposition to unwise bills. Such action to be effective must be prompt.

Such a committee may also suggest to the proper authorities the propriety of the appointment of engineers as members of commissions and boards. I do not mean that we should embark upon the treacherous sea of politics, but that we will do well to be informed regarding possible action, and in a dignified, respectful manner make certain that consideration is given to the engineering profession. During the past year the Board of Government authorized a communication to his Excellency the Governor regarding the desirability of the appointment of an engineer to the Advisory Council of the State Department of Health. The Governor extended the courtesy of an invitation to the president and secretary of the Society to a conference at which this matter was discussed, and the Governor displayed an interest in the appointment of an engineer as a member of this Board. Later, such an appointment was made. While the action of the Board of Government upon this matter may have had no direct effect, the fact remains that an engineer was appointed and recognition thus accorded the profession.

Publicity. — For a brief period during the past year, the Society had a regularly appointed publicity agent, Mr. Roland B. Pendergast. Unfortunately for the Society, but we hope fortunately for Mr. Pendergast, he was appointed secretary to one of the government officials in the Philippines, and was therefore obliged to sever his connection with the Society.

The efforts of Mr. Pendergast resulted in our having about five columns of descriptive matter in the local press regarding the address of Henry M. Waite, City Manager of Dayton, Ohio, presented to the Society November 18, 1914. While this was a particularly favorable subject for newspaper articles, there seems to be no doubt that a properly directed effort might result in a large measure of publicity on many occasions. In this connection, a word of caution may not be out of place, for it is of the utmost importance that care be exercised in the selection of a publicity representative and in the supervision of the work, for all articles appearing in print should be dignified and truthfully representative of the transactions of the Society. The subjects must be so selected and presented as to interest the public, since the newspapers will not accept material which is not of marked public interest.

Probably no field of effort, however, will yield a larger return in bringing the work of the engineer to the attention of the public and in securing from the public a proper recognition of its merits than well-prepared newspaper notices. It therefore seems desirable that a committee should be appointed to attend to this sort of publicity. It is difficult to foresee what expense will be involved in such a movement. There are some who feel that a society of so large a membership should have members who, without compensation, are willing to devote time and labor to reporting its meetings and transmitting proper notices to the newspapers. On the other hand, considerable work is involved, and it must be done at hours which make it more or less laborious. It is not improbable, therefore, that if the Society should undertake an active campaign of this kind, it will be obliged to finance the effort to a moderate extent. The Society was particularly fortunate in receiving the services of Mr. Pendergast without compensation.

Resources. — Having considered some of the obligations of the Society and suggestions for increasing its activities, it is important to give attention to its resources, for no movement, however meritorious, can be started and carried to successful completion if it involves effort and financial backing in excess of the capabilities of the Society.

The completion of the first volume of the JOURNAL has demonstrated the ability of the Society to successfully maintain this enterprise, which is one of the most important it has ever undertaken; and we may go even so far as to assume that there need be no further anxiety regarding the ability of the Society to finance this project.

Most of the suggestions which I have made require for their consummation only the personal effort of our members. It must be recognized that there is a limit to the amount of time engineers can devote to such work. However, relatively few of our members take a part in the management of the Society or in the preparation of papers and discussions for it. Probably not more than 10 per cent. serve in any office, upon any committee, present papers or take part in discussions during any year. This leaves 90 per cent., or some 900 members, who can be called upon for assistance. Furthermore, it will be found that many of the members who so serve the Society do so year after year. This is a fact to be seriously considered by a society having within its membership efficiency engineers. Our organization can hardly be classed as reasonably efficient when only 10 per cent. of its members are producers. It does not appear extravagant to predict that its efficiency can be raised to 25 per cent. and even 50 per cent., if need be, to accomplish what is clearly desirable. Such an increase in efficiency would not only be beneficial in making possible the few things suggested, but the reflex influence upon those members who would become producers would be so great that the Society would witness a revival of interest and enthusiasm which would make its work stand out before the public in such a manner that it would compel recognition.

Another of our resources is the great number of engineers in this vicinity who are amply qualified for membership. We must recognize the present unfavorable conditions, but in ordinary times, if we fulfill our obligations to all of our members and take the " place in the sun " to which we are entitled, there is no reason why we should not greatly increase our membership. In this way we can increase the number of producers and also our income.

The increase in members this year, including applicants elected and applications on file, has amounted to nearly 20 per cent. There should result a corresponding increase in receipts from dues which will enable us to finance greater things in the future. But greater activity calls for greater expenditures. The campaign for more members has cost considerable for printing and postage, and this, with our social activities and a determined effort to improve our library by completing files, binding and indexing, have made it advisable to temporarily employ a stenographer to relieve the assistant librarian of some of her clerical duties. It is safe to predict that in the future there will be no great surplus, and it may be necessary to call upon the Permanent Fund for assistance in financing worthy objects.

Permanent Fund. — Article 9 of the By-Laws provides:

> " 9. *Permanent Fund.* — There shall be a fund called the Permanent Fund, to which shall be added all money received for entrance fees and all income from investments of the fund. No money shall be appropriated from the fund except by a two-thirds vote at two successive regular meetings. Any such appropriation or any part thereof not used within three years shall be returned to the fund."

This fund now amounts to approximately $35 000. The curve of its increase during the last fifteen years approximates a straight line which if extended would pass the $50 000 point at about 1922, or in seven years. Our present fund of $35 000, increased alone by interest compounded annually at 5 per cent., and assuming no losses, will amount to $57 000 in 1925 and $72 800 in 1930. As most of our interest is compounded semiannually, and the remainder quarterly, the fund will probably grow even faster than these figures indicate if an average rate of 5 per cent. can be maintained. Our By-Laws provide that entrance fees also shall be added to this fund.

This is and will continue to be a goodly fund for such a Society, and should be carefully guarded against inroads for trivial, indefinite or immaturely considered purposes.

There is no constitutional provision specifying the object for which the Permanent Fund is being accumulated. Some have felt that the time will come when the Society will desire a home of its own, and that this fund will aid in procuring it. There are others who think this is unlikely, and that it will always be better to lease quarters than to attempt to own them. Some feel strongly that a portion of the income may be expended with propriety from time to time as worthy objects present themselves, and that the Society should not lay by annually all of its receipts from entrance fees with no definite purpose in view.

Such a fund is of great value to the Society. It gives it an importance in the community which it would not otherwise have. The members feel a sense of responsibility on account of it. Its effect upon the Society is much the same as that of a bank account upon an individual. All members should take pride in it and experience pleasure at seeing it grow.

Nevertheless, we may well consider if, after all, it would not be well to utilize a part of our income as we go along. An individual may be able to exist upon a small part of his income and invest the remainder. But such a course may not always be best for him. He may even increase his income by the judicious expenditure of a portion of the surplus above the amount required for his absolute necessities. It may be so with this Society.

Conclusion.

A survey of the present condition of the Society and a study of its capabilities demonstrates that we can make it just as valuable as we wish, to its members, to the profession and to the public. The chief requirements of the members are interest, enthusiasm, initiative and a willingness to work for it. The financial problems will take care of themselves. If we will devote an amount of time very small in proportion to that which we spend in establishing and maintaining efficiency for our employers and clients, to promoting efficiency in this organization, the results will far surpass our fondest ambitions.

Vol. II APRIL, 1915 No. 4

BOSTON SOCIETY OF CIVIL ENGINEERS
FOUNDED 1848

PAPERS AND DISCUSSIONS

This Society is not responsible for any statement made or opinion expressed in its publications

ADDRESS AT THE ANNUAL MEETING OF THE SANITARY SECTION, MARCH 3, 1915.

THE CIVIL ENGINEER'S CAPACITY FOR LEADERSHIP.

By Bertram Brewer, Chairman.

There is no greater service that one can do for himself or his fellows than to try to enlarge the view by bringing to it a bigger or better conception of one's calling. It is well for us that the officers of engineering societies have over and over again applauded the work of the engineer and proclaimed his large place in this busy world. The sanitary engineer has already attained a wide influence in national and municipal life. When men take things too much into their own hands, in their mad, unthinking race for possessions, the sanitarian is one of the privileged few who can come on to the scene with a "Thou shalt not" in his possession.

The work of this Section has made itself felt over a wide area, and its influence has extended far beyond anything that any feeble words of mine can portray. Yet our dreams are not fulfilled. The cup of opportunity to realize on the vision is still brimming over.

With this high conception of our work and our organization in mind, your retiring chairman would beg the privilege of pointing out the sore need of emphasizing, of encouraging and ennobling the work and the person of the engineer in public life. There are two or three phases of the municipal problem which might well be emphasized to-night.

First let me call attention to the fact that in all our helping and enthusing we have been unable thus far to reach many of our municipal workers. Very few of these gentlemen belong to this Section, and still fewer attend the meetings. We ought to have them with us here. The year's experience has raised the question, over and over again, — How can we get them in? I would suggest that a committee be appointed to canvass the situation and make recommendations. An interrogatory, wisely and tactfully conducted, might furnish some clews which would be of help. A special evening could be set aside, this coming year, and such a committee be given a free hand in its endeavors to encourage a large attendance of men in the sewer or health service of Metropolitan Boston.

In the second place, your attention is called to a fact seldom realized, that while the first and most important part of the city planning problem is the sanitary one, no one ever hears of sanitary engineers mentioned in connection therewith. A noted landscape architect who sees deeper than many in his profession has this to say on the subject, — "Essential as the elements of sewerage and drainage are to any comprehensive city plan, the planning of them runs on to-day in many places independent of the city plan, and has little influence on the city planning movement." A class of men is being rapidly clothed with authority in Massachusetts cities and towns, called city planners, who utterly ignore the engineer except as a servant to run the transit and rod. For city planning purposes we are supposed not to exist.

Now, gentlemen, we have got to get our minds open to the larger problems as well as the smaller, to the big city itself as well as the infinitesimally small bacterial inhabitant thereof. Our imaginations have not been properly stirred to the point where we understand our prerogative. We, too, should enter the open door. The city planner goes around proclaiming his visions of the New Jerusalem, backed up with innumerable lantern slides of chimerical projects, involving years of efforts and millions of money. He is trained to express his thoughts in an attractive and inspiring manner, and he is able to point with pride to his noble program and arouse the imagination of his audience to concert pitch, while we, forsooth, spend all of their money and too much of our time in planning and building sewers and filter beds to destroy the deadly pathogenic germ. I venture to say that not until sanitary engineers, and all engineers, get a larger conception of municipal engineering in its relation to the big city plan, and begin to realize that it is the vital part thereof, will good and efficient government come to our cities.

Our conception of our work must also be large enough and strong enough to make us more intelligent about advertising our wares. We too must cultivate some of the accomplishments of our professional brethren. We too must acquire felicity and facility in writing and speaking. Our meetings should be more generally written up for the papers. We ought to appoint a committee on publicity. The public has no adequate conception of what we are doing, and we ought to undertake a scientific method of giving them the information they need.

Let me add a final word, — There's enough clap-trap advertising of cheap wares and nostrums to fill the advertising columns of all the papers on this continent, and enough cheap politicians and fakers to supply the full demand, but until we, who are doing much of the real work of the world, take it upon ourselves to educate and inform the people and stir their imaginations by a concerted and intelligent effort, they will continue to be led far, and far astray about us.

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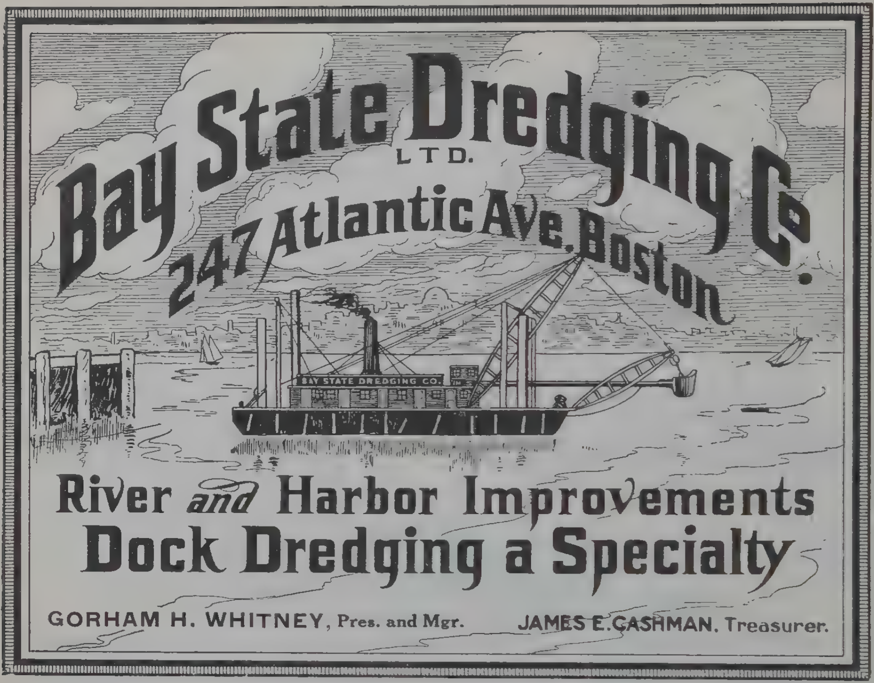
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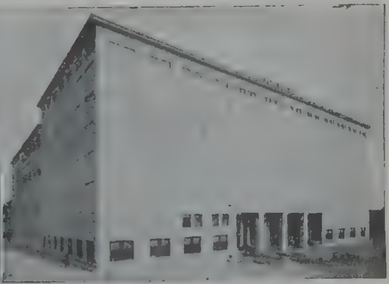

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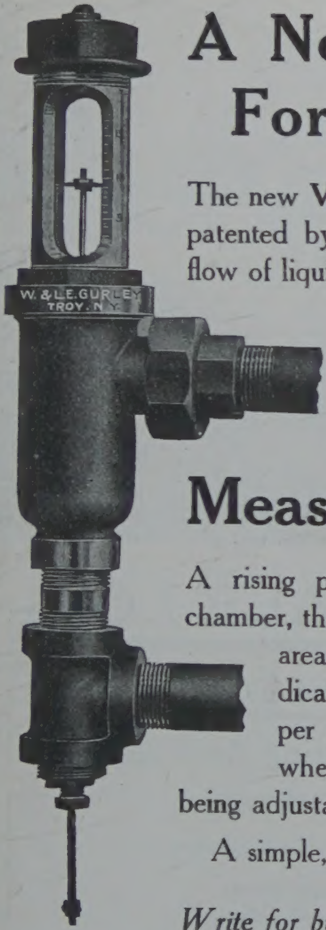

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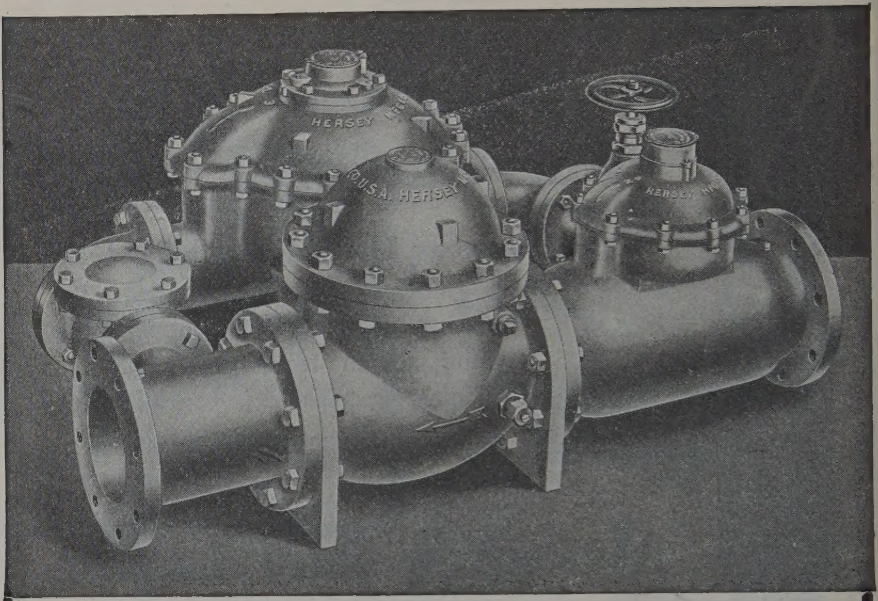

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